

AD 709992



INSTRUCTIONAL STRATEGIES:  
Multivariable Studies of Psychological  
Processes Related to Instruction

The Effects of Uncertainty, Confidence, and Individual  
Differences on the Initiation and Direction of  
Information-seeking Behaviors

Charles B. Schultz

Technical Report Number 2

July, 1970

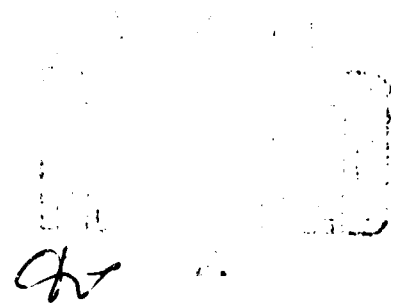
Advanced Research Projects Agency

ARPA Order No. 1269

Monitored by

Office of Naval Research

Contract Number N00014-67-A-0385-006



Department of Educational Psychology  
The Pennsylvania State University

This report is for internal use only and is not to be distributed outside the organization.

191

TECHNICAL REPORT NUMBER 2

July, 1970

The Effects of Uncertainty, Confidence, and Individual  
Differences on the Initiation and Direction of  
Information-seeking Behaviors

Charles B. Schultz

ARPA Order Number:	1269
Program Code Number:	60949
Name of Contractor:	Pennsylvania State University University Park, Pennsylvania 16802
Effective Date of Contract:	1968 September 1
Contract Expiration Date:	1970 August 31
Principal Investigator	Francis J. Di Vesta
and Phone Number:	865-6347
Title of Work:	Instructional Strategies

Sponsored by  
Advanced Research Projects Agency

ARPA Order No. 1269

The Pennsylvania State University

The Graduate School

The Effect of Uncertainty, Confidence, and Individual  
Differences on the Initiation and Direction  
of Information-seeking Behaviors

A Thesis in

Secondary Education

by

Charles B. Schultz

Submitted in partial fulfillment  
of the Requirements  
for the Degree of

Doctor of Philosophy

September 1970

Date of Approval:

---

Francis J. Di Vesta  
Professor of Education and Psychology  
Thesis Adviser

---

John E. Searles  
Associate Professor of Education  
Co-Chairman of Committee

---

Ralph T. Heimer  
Professor of Education  
Co-Chairman of Committee

---

Herbert A. Aurbach  
Associate Professor of Education and  
Sociology

---

Gerald Bosch  
Associate Professor of Education  
In Charge of Graduate Programs,  
Secondary Education

## ACKNOWLEDGEMENTS

The research described in this report owes much to the help given by others at various stages of its inception and development. John E. Searles made possible a graduate program which was flexible enough for me to pursue interests which culminated in this study; he was particularly helpful in his suggestions regarding the organization of the manuscript and the application of the findings to instruction. Ralph T. Heimer's concerned and careful review of this research resulted in pointed suggestions which added to the clarity and substance of the present form of the manuscript. Herbert A. Aurbach's encouragement and assistance provided much of the impetus and experience necessary to accomplish work at a professional level. This research would not have been possible without the guidance of Francis J. Di Vesta, thesis adviser. His exacting questions, insightful suggestions, and insistence on high standards were demanding and instructive. They improved the quality of this work immeasurably.

A selfless wife and family sacrificed themselves for me too often.

The research reported below was supported by a contract providing for a program of research on instructional strategies monitored by the Office of Naval Research (Contract Number N00014 - 67 - A - 0385 - 0006, Advanced Research Projects Agency, Order Number 1269).

## TABLE OF CONTENTS

	Page
Acknowledgements. . . . .	iii
List of Tables . . . . .	vi
List of Figures . . . . .	vii
I. INTRODUCTION. . . . .	1
The Problem: The Effects of Uncertainty on Learning. . .	1
Uncertainty and Discovery: The Relevance of the	
Problem . . . . .	3
The Study of Instruction: An Approach to the Problem . .	5
Summary . . . . .	9
II. RATIONALE AND HYPOTHESES. . . . .	11
Uncertainty . . . . .	11
Uncertainty and Selective Exposure. . . . .	13
Uncertainty, Selective Exposure, and Individual	
Differences . . . . .	17
Hypotheses. . . . .	22
III. REVIEW OF THE LITERATURE. . . . .	26
Information-seeking and Uncertainty . . . . .	26
Information-seeking and Selective Exposure. . . . .	36
Information-seeking and Individual Differences. . . . .	43
Summary . . . . .	49
IV. METHOD. . . . .	51
Experiment I. . . . .	51
Subjects. . . . .	53
Stimulus Materials and Apparatus. . . . .	54
Procedures. . . . .	56
Measures. . . . .	64
Experiment II . . . . .	69
Subjects. . . . .	69
Measures. . . . .	70
Procedures. . . . .	71

	Page
V. RESULTS . . . . .	73
Experiment I. . . . .	73
Hypothesis I. . . . .	75
Hypothesis II . . . . .	78
Experiment II . . . . .	89
Hypothesis III. . . . .	91
Hypothesis IV . . . . .	96
Hypothesis V. . . . .	100
VI. DISCUSSION. . . . .	103
The Effects of Uncertainty on Interest, Examination, and	
Acquisition of Knowledge. . . . .	103
Selective Exposure. . . . .	109
Individual Differences and Selective Exposure . . . . .	117
Summary . . . . .	125
VII. SUMMARY . . . . .	127
REFERENCES. . . . .	138
APPENDIX A--THE UNCERTAINTY SCALE . . . . .	147
APPENDIX B--MATERIALS USED TO MANIPULATE CONFIDENCE . . . . .	156
APPENDIX C--EXPERIMENTAL MATERIALS. . . . .	159
APPENDIX D--DEPENDENT MEASURES. . . . .	169

## LIST OF TABLES

Table		Page
1	MEASURES OF DEPENDENT VARIABLES ACCORDING TO TYPE OF MEASURE EMPLOYED . . . . .	57
2	ORDER OF SLIDE-PAIR PRESENTATION. . . . .	65
3	INDUCTION OF EXPERIMENTAL MANIPULATIONS: MEANS AND STANDARD DEVIATIONS FOR AMOUNT OF CONFLICT REPORTED BETWEEN SLIDES OF EACH SET AND REACTION TIME FOR THE 16 SEGMENT II SLIDE-PAIRS . . . . .	74
4	MEANS AND STANDARD DEVIATIONS FOR AMOUNT OF INTEREST, EXAMINATION, AND ACQUISITION OF KNOWLEDGE . . . . .	76
5	MEANS AND STANDARD DEVIATIONS FOR SELF REPORT RATING OF CONGRUENT, NEUTRAL, AND DISCREPANT ARTICLES. . . . .	80
6	MEANS AND STANDARD DEVIATIONS FOR SELF REPORT INTEREST IN CONGRUENT AND DISCREPANT SLIDES. . . . .	84
7	MEANS AND STANDARD DEVIATIONS FOR CHOICE AND EXAMINATION OF DISCREPANT SLIDES. . . . .	85
8	MEANS AND STANDARD DEVIATIONS FOR PERCENTAGE OF TEST ITEMS CORRECT FOR SUB-SCORES REQUIRING KNOWLEDGE OF CONGRUENT, DISCREPANT, AND BOTH CONGRUENT AND DISCREPANT INFORMATION . . . . .	87
9	MEANS AND STANDARD DEVIATIONS FOR AMOUNT OF CONFIDENCE REPORTED BEFORE AND AFTER EXAMINATION OF SLIDE-PAIRS. . . . .	90
10	MEANS AND STANDARD DEVIATIONS FOR SELECTION OF CON- GRUENT, NEUTRAL, AND DISCREPANT ARTICLES. . . . .	92
11	MEANS AND STANDARD DEVIATIONS FOR REPORTED INTEREST IN CONGRUENT AND DISCREPANT SLIDES. . . . .	93
12	MEANS AND STANDARD DEVIATIONS FOR CHOICE AND EXAMINA- TION OF DISCREPANT SLIDES . . . . .	94
13	MEANS AND STANDARD DEVIATIONS FOR NUMBER OF ITEMS CORRECT REQUIRING KNOWLEDGE OF CONGRUENT, DISCREPANT, OR BOTH CONGRUENT AND DISCREPANT INFORMATION. . . . .	95
14	CORRELATION COEFFICIENTS BETWEEN RATINGS ON PERSONALITY SCALES AND MEASURES OF SELECTIVE EXPOSURE . . . . .	101

## LIST OF FIGURES

Figure		Page
1	Scheme for investigation of instruction with application to the present study. . . . .	8
2	The relationship between the design of Experiment I and Experiment II . . . . .	52
3	Position of apparatus in experimental room. . . . .	58
4	Responses registered on event recorder tape for the examination of a typical slide-pair . . . . .	59
5	The effect of Incongruity and Certainty on interest and acquisition of congruent and discrepant information. . . . .	82
6	Regression lines describing the hypothesized relationship between dogmatism and preference for discrepant information and the obtained relationship between dogmatism and discrepant slide choice. . . . .	98
7	Regression lines describing the relationship between dogmatism and the D/E Ratio and dogmatism and the percentage of discrepant items correct. . . . .	99

## CHAPTER I

### INTRODUCTION

Rothkopf (1968) has distinguished two scientific approaches to the study of instruction: the calculus of practice and mathemagenic behaviors (activities that give birth to learning). As an example of the calculus of practice, school libraries would be programmed so that student learning would move efficiently from one carefully selected bit of information to the next. The primary concern of the educator would be with the economical arrangement of instructional materials. As an example of mathemagenic behaviors, the library would be accepted essentially as it is and students would search for and acquire the relevant knowledge. The primary concern of the educator would be with the generation of those activities that are effective in getting students to remain in the library in the first place and then to search for relevant knowledge. In one sense at least, the problem posed here for investigation follows the latter approach. It is concerned with the initiation and direction of epistemic or information-seeking behaviors.

#### The Problem: The Effects of Uncertainty on Learning

Consider this hypothetical classroom situation. An eleventh grade social studies class has agreed that soil exhaustion accounts for the frequent migrations of tribal groups using slash-and-burn

agricultural techniques. They appear committed to this conclusion to the extent that it meets the dictates of their "common sense." The instructor then announces that "common sense" may be misleading. He advances an alternative explanation, the essence of which suggests that these tribal groups migrate because of the low protein content of their diets. Study materials that contain some information supporting the students' conclusion and some supporting the teacher's alternative are then distributed. The intention of the instructor, in this hypothetical example, was to produce uncertainty by proposing an alternative explanation to the one proposed by the students and thereby generate student interest in further exploration of the implications associated with the less obvious alternative.

The present investigation was initiated in the observation that skilled instructors artfully inject counter-arguments into discussions to motivate, maintain, and direct learning. Presumably, by so doing, they create a subjective state in the student which may be called "uncertainty," a construct that for the moment will be left undefined. A major purpose of the present investigation was to examine the effects of the induced state of uncertainty on learning. More specifically, the study described here was directed toward an investigation of the effects of those instructional strategies, which were believed to produce uncertainty, on:

(a) The initiation and maintenance of the learner's search for information about an instructional topic and the consequent acquisition of knowledge about that topic.

(b) The acquisition of knowledge about the position which contradicted the student's point of view.

(c) The epistemic behaviors of persons who varied in their open- or closed-mindedness, amount of certainty in a problematic situation, and tolerance of ambiguity.

These questions were investigated in a laboratory experiment. Essentially the procedure consisted of presenting Ss with a choice of examining information that agreed with their existing beliefs (congruent) or information that contradicted those beliefs (discrepant). The Ss were subjected to manipulations of certainty and uncertainty as well as two levels of experimentally induced confidence. Measures of personality traits including dogmatism, subjective uncertainty, and intolerance of ambiguity were also obtained. An analysis was made of the effect of the experimental treatments and individual differences on the S's interest in and retention of the general topic and of the discrepant information.

#### Uncertainty and Discovery: The Relevance of the Problem

The emphasis on discovery strategies is one of the major curriculum developments of the last decade. Within this framework the notion of uncertainty in the form of contrast, surprise, doubt, perplexity, bafflement, and contradiction has been employed by a number of advocates from a variety of orientations (e.g., Berlyne, 1965a; Bruner, 1966).

Uncertainty has an older tradition in problem-solving approaches to education than does the recent vogue of discovery. The pragmatic school of philosophy has long viewed perplexity as the beginning of reflective thought. For Dewey the indeterminate situation, including

the tendency "to evoke discordant responses" (Dewey, 1938, p. 5), is an antecedent condition for inquiry. Later conceptions (Berlyne, 1965b; Bruner, 1966; Sieber, 1969) made a similar claim: The success of discovery strategies rests on the capacity of uncertainty to motivate the information-seeking behaviors so essential to the acquisition of information or to the solution of problems. Thus, initiation of informational search is one function uncertainty may play in the execution of discovery strategies.

The state of uncertainty can be induced by confronting the student with a situation about which (a) he has no knowledge or existing beliefs; (b) his knowledge or existing beliefs contain contradictions; or (c) his knowledge or existing beliefs are discrepant with the viewpoint of experts or with empirical evidence. The latter condition underlies the hypothetical classroom example described earlier as well as the present investigation. It is also prevalent in instruction involving social issues where the student must examine and learn from material that is both congruent and discrepant with his position.

A second, more subtle, contribution uncertainty may make to discovery is to provide direction to the student's efforts. Thus, the uncertain student's search for information is directed toward a point of view other than the one already held (i.e., the person's attention is directed toward discrepant information). In a typical discovery or problem-solving situation the dominant response is incorrect or inappropriate. Arrival at a correct solution requires the identification of a belief or response other than the existing (dominant) one; frequently a discrepant piece of information may be required. Even

though such information is made available to the learner, he may not be receptive to accepting it especially if it contradicts his existing beliefs (Festinger, 1957, 1964). However, uncertainty in the form of incongruity and doubt is hypothesized to direct the search for the discrepant information thereby facilitating identification and utilization of the less dominant belief or response.

Because of differences among individuals, all students may not be able to benefit equally from discovery strategies (Cronbach, 1966). Such techniques require a dispositional tendency for uncertainty; that is, a willingness to generate alternative responses to a stimulus pattern. Sieber (1969) claims that the ability to recognize there are many answers to a question, to doubt the certainty of a single solution is a skill which may require intensive training. If there is anything certain about discovery strategies it is that they require the student to live for extended periods of time with uncertainty, complexity, and contradiction. He must be task-oriented rather than authority-oriented. Thus, the effectiveness of discovery strategies on what the student learns may be modified by dispositions associated with open-mindedness, subjective uncertainty, and intolerance for ambiguity.

#### The Study of Instruction: An Approach to the Problem

Agreement about a definition of instruction to guide empirical investigations of the instructional process has been more difficult than criticizing the applicability of "classical" learning theory to the classroom, on the one hand, or the looseness and inconsistency

of much of educational, field research on the other (Ausubel, 1967; Carroll, 1964, 1965; Cronbach, 1966; Gage, 1964; Rothkopf, 1965, 1968; Woodruff, 1967). Consensus has not been reached on such a basic question as the part learning plays in the study of instruction.

One attack avoids the learning process altogether. For example, Smith (1961) carefully distinguished teaching from learning and proposed the investigation of teaching apart from entanglements posed by the problems of studying learning. Many of those who constructed observation schedules for the analysis of classroom behavior focused exclusively on the behavior of the teacher (Medley and Mitzel, 1958; Smith and Meux, 1962; Withall, 1949). Others avoided explicit examination of the learning process by proposing instructional theories based on direct comparisons of observed teacher behavior and student gains (Ashner, 1961; Flanders, 1965).

Another approach (Bruner, 1966; Gage, 1964) suggested that theories of learning are descriptive (i.e., they describe how learning occurs in the organism) while theories of teaching or instruction are prescriptive (i.e., they suggest how to get the organism to learn). Presumably, theories of instruction, though different from theories of learning, must necessarily parallel theories of learning. Thus, if one is to develop an instructional theory within this approach, learning theories must be extended to include facets of instruction such as instructional objectives (Gage, 1964). Even so, some investigators are content to apply directly their particular learning theory to classroom instruction. This is true of orientations that are behavioral (Jahnke, 1967), cognitive (Ausubel, 1967; Woodruff, 1967), or eclectic (Gagne, 1967).

The present investigation conceives of instruction as a process comprised of input variables (e.g., visual or verbal messages or the teacher's instructional behavior) and output variables (e.g., retention, transfer, skill development, and attitude change). The function of the instructor is to manipulate input variables which are assumed to differentially affect learner outputs. Differential outputs result, in part, from learner predispositions which modify the effects of instructional manipulations and from differences in the learner's covert processes and overt activities which are further assumed to have considerable influence on classroom learning (Rothkopf, 1968).

The relationship among the variables is presented in Figure 1a in which the effects of the teacher's instructional strategies (A) are mediated by an individual's motivational state, cognitive structure, and cognitive styles (B). These personality and cognitive traits are assumed to modify cognitive processes (C) such as those involved in attention, and storage and retrieval. They also affect overt student behaviors (D). While pupil gain (E) may directly follow from these covert processes (e.g., incidental learning), most pupil gain in classroom settings is further mediated by a form of overt student behavior (D) such as verbal responding, notetaking or even more subtle searching and listening behaviors.

In applying this scheme to the present study (Figure 1b) the amount of response competition a person experiences (C) is presumed to be affected by the level of dogmatism, intolerance of ambiguity, and subjective uncertainty (B) as well as the manipulation of uncertainty and confidence (A). Moreover, the amount of response competition is

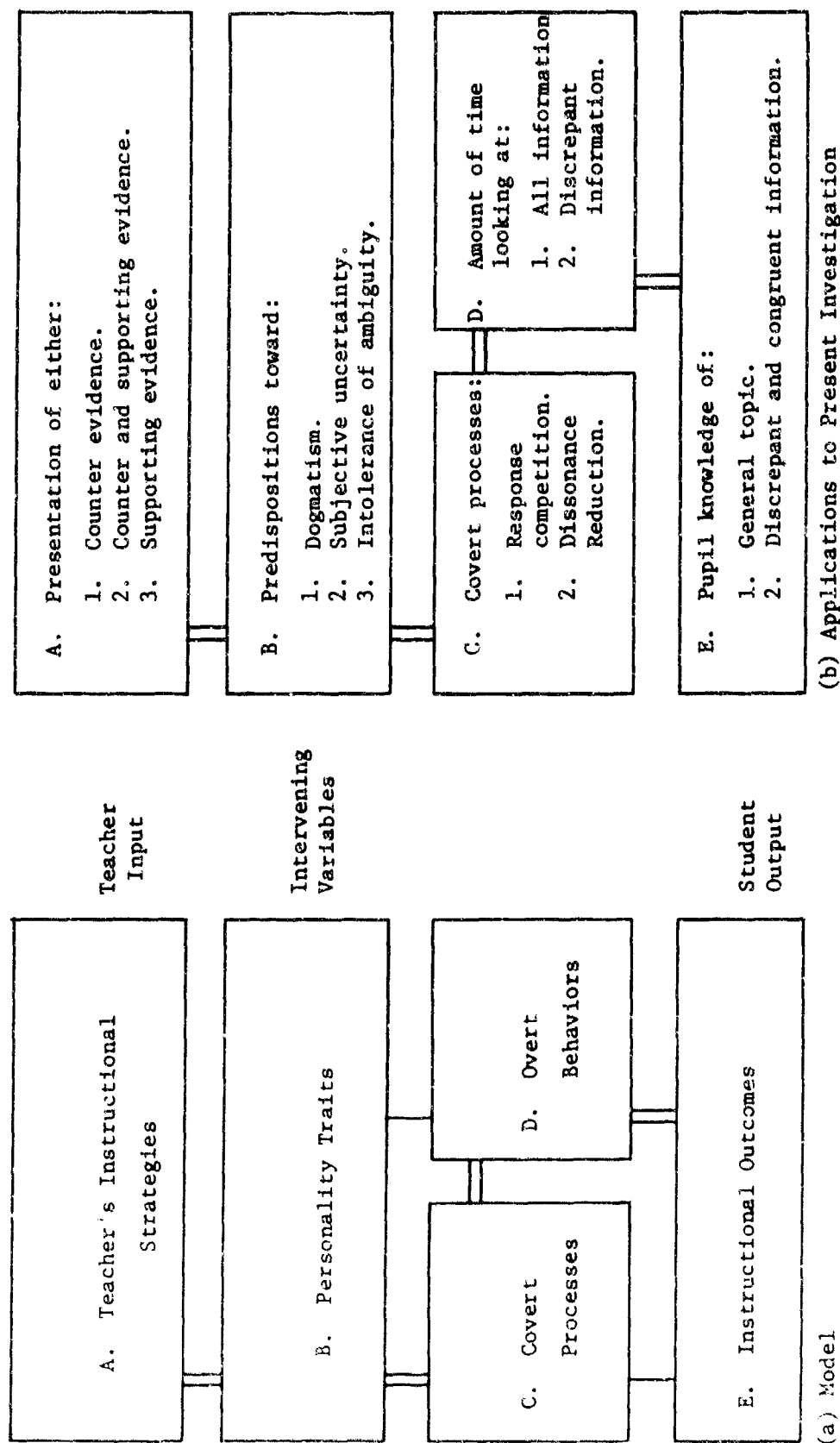


Figure 1. Scheme for investigation of instruction with application to present study.

assumed to influence the initiation and direction of information-seeking behaviors (D), which will, in turn, influence the amount and type of learning (E).

Because instruction occurs in a social context even when it is individualized, because it takes place over an extended time, and because the nature of the subject matter varies, this study contains obvious limitations. That is, extrapolation to the classroom must be qualified by variables that have not been considered within the present framework. Nevertheless, the approach to instruction outlined here has several advantages: It permits controlled research under laboratory conditions; it includes manipulations that can be realistically invoked by the teacher; and at the same time it includes covert processes related to learning (e.g., response competition) within the scope of its domain and can thereby profit from relevant theory and findings in learning.

#### Summary

The purpose of this study was to explore the effects of uncertainty and the mediating effects of personality differences on the initiation and direction of information-seeking behaviors and on the acquisition of knowledge. The generation of uncertainty was related to the current interest in discovery strategies. The function of uncertainty may be to initiate and maintain the discovery process and to induce the learner to be more receptive toward less dominant responses or beliefs. According to the present conception, the investigation of instruction is an interactive process in which the effects

of instructional inputs are mediated by the learner's predispositions, covert processes associated with learning, and mathemagenic behaviors.

## CHAPTER II

### RATIONALE AND HYPOTHESES

The rationale for this study drew heavily upon theoretical constructs in educational and social psychology, especially those encompassing the motivational effects of curiosity. A dominant interest within this framework was the identification of those conditions that affect motivation and learning in the classroom and that could be easily translated into instructional practice. The full scheme for investigations into the instructional process, as depicted in Figure 1, included the instructional antecedents to and the instructional consequences of the student's covert cognitive processes.

#### Uncertainty

A particular concern in this investigation was with the conditions that induce individuals to seek and acquire knowledge, a state of motivation sometimes referred to as epistemic curiosity. The arousal of this motive was hypothesized by Berlyne (1960) to be related to the amount of uncertainty produced by competing response alternatives. Uncertainty was assumed to be heightened by the increased number of competing responses and by their equiprobability. In several experiments, Berlyne (1962) demonstrated that curiosity is a function of these two determinants of uncertainty. Moreover, the drive-like state of curiosity can be reduced by acquisition of information. Since these

conceptualizations ascribed drive-like qualities to curiosity, information acquired in association with the reduction of curiosity was assumed to be better learned than information that does not reduce it. In short, uncertainty-produced curiosity can be reduced by the acquisition of information, that is, by information which reduces the number and/or equality of strength of competing responses.

The relevance of the foregoing statements to the present study is as follows:

- (a) There is some evidence that uncertainty arouses curiosity.
- (b) The construct of uncertainty has been sufficiently well-defined to permit its manipulation in experimental settings.
- (c) Behavior that leads to the acquisition of information is instrumental or useful to the person if it reduces uncertainty.
- (d) There is a nomological network, relating learning and uncertainty, comprised of statements that can be, but as yet have not been, tested (Berlyne, 1965a).

Important in the fourth point is the drive-like quality attributed to curiosity. A study of Mittman and Terrell (1964) provided limited support for this notion by demonstrating that information which reduced curiosity had reinforcing properties. Because of the relationship it established between uncertainty and learning, Berlyne's formulation is especially useful for the present study. Unlike consistency models, it suggested that uncertainty produced heightened curiosity and thereby initiated greater information-seeking and learning than conditions of certainty.

### Uncertainty and Selective Exposure

This study was also concerned with the conditions that induce individuals to seek and acquire discrepant information, that is, information inconsistent with beliefs already held by the individual. According to Festinger's (1957) early theory of cognitive dissonance, conflicting cognitions occur from the knowledge that information one receives is inconsistent with one's existing beliefs. The resulting dissonant state is psychologically disturbing for the person. As a consequence, the person is motivated to employ dissonance-reducing activities such as seeking information congruent with his position, which reduces dissonance, and/or avoiding discrepant information (selective exposure) which otherwise would tend to increase dissonance.

Although Festinger's assumptions have generated productive research, the results in regard to selective exposure have been equivocal at best (Brehm and Cohen, 1962; Freedman and Sears, 1965). For example, Freedman and Sears (1965) argue, "Clearly, experimental evidence does not demonstrate that there is a general psychological tendency to avoid nonsupportive and seek supportive information" (p. 69).

In 1964 Festinger modified his earlier formulations in order to explain instances in which individuals have sought or at least failed to avoid discrepant information. He suggested that individuals may be receptive to discrepant information when that information is useful to them and when they are sufficiently confident of their ability to refute whatever counter-arguments are implied by the discrepant information. (The relationship of both of these modifications to uncertainty will be considered below.) Usefulness has been employed

as an explanatory construct by Canon (1964), Freedman (1965a), and Freedman and Sears (1965) in post hoc explanations of results which implied that discrepant information had been sought. Canon (1964) specifically designed an experiment to examine the effects of both usefulness and confidence on selective exposure. He found that both factors influenced the S to select discrepant information. However, in a replication of the same study by Freedman (1965a) only support for utility of information was obtained. Not only was the effect of utility a strong one but he was more successful than Canon in inducing the confidence manipulation for which no effect was obtained.

In selective exposure experiments, (in which S is presented with a choice between information which is congruent and information which is discrepant with his existing beliefs) discrepant information may be selected because it is of either extrinsic or intrinsic utility. Extrinsic utility refers to the "practical" use made of information in order to solve a problem or improve an individual's well-being. Discrepant information was sought for its extrinsic utility when S assumed that the information would improve his test grade (Mills, Aronson, and Robinson, 1959; Rosen, 1961), improve his health (Feather, 1962), or avoid humiliation in a debate (Canon, 1964; Freedman, 1965a).

Intrinsic utility refers to the use of information to reduce the number or equality of competing responses, i.e., to reduce uncertainty associated with the congruent and discrepant beliefs. The intrinsic utility of discrepant information is greater when experimental conditions increase the strength of the discrepant belief, rendering it equal to the existing belief. For example, S may be told that an

expert with specific knowledge of the experimental topic supports the discrepant belief or the experimental situation may be one in which S has been given only a one-sided message although he normally expects "another side" (e.g., S is given only the prosecution position of a jury trial). When the existing belief is suddenly found to compete with another that also appears valid, information about the discrepant belief may be sought for its intrinsic utility, that is, because information about the discrepant belief holds the potential for reducing uncertainty.

The rationale on which this study is based suggests that uncertainty affects the intrinsic utility of information and so directs information-seeking behaviors. Suppose, for example, that an opinion held by the S is confirmed by another whom he considers to be an expert. The consequent increase in certainty causes the strength of competing responses to be unequal. Accordingly, the discrepant information holds no intrinsic utility. Consistent with the tenets of selective exposure, such information would be ignored. However, when S is presented with reliable evidence that contradicts his knowledge or belief; that is, the evidence is incongruous, the strengths of the competing responses are nearly equal. Discrepant information is thereby rendered useful for the reduction of uncertainty. Moreover, when S is presented with information by experts who are undecided or with contradictory evidence the person may come to doubt his own point of view since the strengths of competing responses become nearly equal. Under these circumstances both congruent and discrepant information are necessary to resolve the uncertain situation.

In summary, incongruity and doubt direct information-seeking behaviors toward discrepant information; certainty directs them toward congruent information.

The above rationale, particularly that dealing with certainty and incongruity, leads to predictions that are opposed to those deduced from dissonance theory. According to dissonance theory an increase in dissonance is directly related to an increase in preference for congruent information. Increases or decreases in dissonance are manipulated by involuntary exposures to discrepant or congruent information respectively as noted by Freedman and Sears in the following quotation:

Presumably, exposure to discrepant information should arouse dissonance, which can be reduced by seeking information consistent with the original opinions and avoiding information inconsistent with them (Freedman and Sears, 1965, p. 72).

Because the dissonant alternative is dissonance-producing (Festinger, 1964; Freedman and Sears, 1965), the S is not in a position to avoid dissonance in selective exposure experiments; instead, he is forced to reduce it by refutation, by devaluation or by disparagement of the dissonant information. Festinger (1964) argued that voluntary exposure to discrepant information depends on one's confidence in his ability to refute it, although experimental manipulations of confidence and post hoc analyses often have produced mixed results (Freedman and Sears, 1965; Sears, 1968).

In a condition of uncertainty, the highly confident person is more likely to modify the tendency to seek congruent and avoid discrepant information than he would be in a condition of certainty. When an individual is told that some evidence contradicts him and some supports him, he knows there is a discrepant and congruent

position. Since the existence of a discrepant position is made more obvious than in the typical selective exposure experiment by the presentation of evidence contradicting S's existing beliefs, the need to reduce dissonance is increased. As a consequence, those high in confidence (i.e., those who feel they can cope with discrepant information) are more motivated to reduce dissonance by seeking discrepant information for the purpose of refuting it than when contradictory evidence has not been presented.

In summary, the tendency to seek supportive and avoid non-supportive information is modified by the intrinsic utility of the information and the confidence a person has in his ability to refute it. Uncertainty creates a condition in which discrepant information is rendered useful and in which the need to reduce dissonance is increased and therefore more likely to reveal the effects of confidence.

#### Uncertainty, Selective Exposure, and Individual Differences

Personality traits that are assumed to affect the selection of discrepant information include dogmatism, tolerance-intolerance of ambiguity, and subjective certainty-uncertainty.

Analysis of individual differences. Although dogmatism, intolerance of ambiguity and subjective certainty represent different theoretical constructs, they are assumed to share certain attributes. For example, acceptance of authority and compartmentalization of conflicting ideas are characteristics of the dogmatic or closed-minded person (Rokeach, 1960). Since the dogmatic person is threatened by new belief systems, he tends to be more intolerant of ambiguity than

the low dogmatic or open-minded person (Hunt and Miller, 1968; Kleck and Wheaton, 1967). By the same token, the high dogmatic tends not to entertain new alternatives and is therefore certain that his existing beliefs are correct when compared to the behavioral tendencies of the low dogmatic. Predictions of behavior based on intolerance of ambiguity and subjective certainty should, therefore, be congruent with those for dogmatism.

However, in spite of some similarities among these traits they are not to be considered identical. Tolerance-intolerance of ambiguity and subjective certainty-uncertainty, for example, do not embrace the authority dimension of the dogmatism construct. Moreover, both refer to different aspects of response competition. Subjective certainty is a condition in which response competition is not generated; for example, a person is wrong and does not know it or he is certain there is only one response to an ambiguous situation whereas intolerance of ambiguity is a condition in which response competition has been generated, but is avoided because it is threatening to an individual.

The similarities and differences among the above personality traits provide the basis for the following two sections. The first section considers the rationale for parallel predictions regarding information-seeking behavior of the dogmatic, intolerance of ambiguity, or subjectively certain persons; the final section explores the interaction between confidence and dogmatism.

Individual differences in information-seeking under condition of doubt. Doubt, as a construct, is central to this discussion

because it interacts with all the personality traits described above. For the person predisposed to be certain (i.e., who is "slow" to generate response competition), the dominance of existing beliefs is maintained when the individual is presented with as much evidence that agrees with his existing beliefs as he is with evidence that disagrees with those beliefs. Thus, relative to the person who is "quick" to generate response competition, the subjectively certain individual experiences little uncertainty. Consequently, discrepant information holds little intrinsic utility and therefore tends not to be sought. For persons predisposed to be uncertain, presentations of conflicting evidence appear to intensify response competition. Discrepant information is, under these conditions, useful for the reduction of uncertainty and therefore tends to be sought.

Since doubt is a highly ambiguous situation, it differentially affects the information-seeking of those who are tolerant of ambiguity and those who are intolerant of ambiguity. When there are alternate explanations of an event, one which agrees and one which contradicts the person's existing (dominant) belief, discrepant information has the potential for strengthening the discrepant (subordinate) position thereby further increasing the ambiguity of the Doubt Condition. Consequently, exposure to discrepant information may be aversive to those who are intolerant of ambiguity and attractive to those who are tolerant of ambiguity.

The information-seeking of open- and closed-minded persons may also be differentially affected by conditions of doubt. The dogmatic persons, in a doubt situation, choose an expert who supports

their existing beliefs rather than one who supports a new and threatening belief. On the other hand, because the open-minded person is task-oriented and not threatened by new belief systems, discrepant information is sought to reduce the uncertainty of the Doubt Condition. These relationships suggest that when in a state of doubt, subjectively certain persons, those intolerant of ambiguity, and dogmatic individuals will seek information congruent with their existing beliefs while the discrepant alternative appears attractive, as a choice, to those with opposite personality traits.

Interaction between dogmatism and confidence. Confidence, as a manipulable variable, may also interact with dogmatism, although little research has examined the relationships between these variables. Degrees of confidence may differentially affect the dogmatic person but have little effect on the open-minded individual who, at any level of experimentally induced confidence, seeks discrepant information to reduce uncertainty. Under experimental manipulations intended to increase confidence, Ss' existing beliefs are reinforced by presumed experts (i.e., the high confidence treatment is typically induced by "testing" Ss and telling them they are correct, regardless of their answers to the "test" questions). Under these conditions, dogmatic persons are led to consider their existing belief correct because it has been "approved" by an authority. They have no reason to doubt their initial position or to change their beliefs so they tend to seek congruent information rather than face the threat posed by discrepant information.

Under experimental manipulations intended to decrease confidence, the existing belief of the dogmatic person is in opposition to the evidence provided by the experts (i.e., the low confidence treatment is induced by telling Ss they are wrong regardless of their answer to "test" questions). Under these conditions, the beliefs held by the dogmatic person will not be approved by the authority. Accordingly, the dogmatic person will turn to the opposite position, that is, the one advocated by the authority, thereby motivating him to examine information that was discrepant with his original position but is now congruent with his new position. The different responses of high dogmatics to authority under conditions of high and low confidence suggest a complex interaction between the effects of dogmatism and confidence on the seeking of discrepant information.

As indicated above, the present analysis of the interaction between dogmatism and confidence leads to somewhat different conclusions from those that follow from Festinger's (1964) position. According to Festinger, low confidence leads to the general avoidance of discrepant information and high confidence leads to the seeking of discrepant information. The present analysis, on the other hand, suggests that under conditions of low confidence discrepant information will be sought by both high and low dogmatics; but under conditions of high confidence discrepant information will be sought only by low dogmatics. The present argument is advanced as an alternative to that proposed by Festinger, since it leads to different predictions. It is the basis for hypotheses included in the section that immediately follows.

### Hypotheses

Hypothesis I: Uncertainty is directly related to the tendency to initiate and maintain information-seeking behavior with consequent increases in acquisition of knowledge. This expectation is based on two assumptions: Epistemic behaviors are initiated by a condition in which the strength of competing responses is near-equal (uncertainty). The resulting drive-like state (curiosity) is reduced by the acquisition of information. The acquisition of information, in turn, reduces the equality of the responses. The above assumptions lead to the following specific expectations:

- (a) The uncertainty manipulations (Incongruity and Doubt) result in greater ratings of interest than does the Certainty Manipulation.
- (b) The uncertainty manipulations result in longer examination of the experimental materials than does the Certainty Condition.
- (c) More knowledge of the general topic is acquired by persons in the uncertainty conditions than in the Certainty Condition.

Hypothesis II: Uncertainty is directly related to the tendency to seek information about a position discrepant to one's own beliefs, and as a consequence to increases in acquisition of knowledge about the discrepant position. Consistent with the analysis of the effects of intrinsic utility on selective exposure, the sharpest differences in the selection of congruent and discrepant information exist between the incongruity and certainty conditions. Incongruity renders

discrepant information intrinsically useful; thus, the seeking and acquisition of knowledge is directed away from congruent information and toward discrepant information. The corollary to this proposition is that under conditions of certainty discrepant information holds no intrinsic utility; thus, the seeking and acquisition of knowledge is directed away from discrepant and toward congruent information. Doubt results in the seeking and acquisition of knowledge for both congruent and discrepant information, since doubt renders them both useful to the reduction of uncertainty. Thus, it produces greater general interest in, and knowledge of the topic than either certainty or incongruity.

Specifically, the following hypotheses will be tested:

- (a) Incongruity results in higher ratings of interest in discrepant information and greater selection, examination, and acquisition of discrepant information than does Certainty.
- (b) Certainty results in higher ratings of interest in congruent information and greater acquisition of congruent information than does Incongruity.
- (c) Doubt results in higher combined ratings of interest in congruent and discrepant information than do the other experimental conditions.

Hypothesis III: High confidence is directly related to the examination and acquisition of knowledge about discrepant information.

Festinger's (1964) elaborations of earlier explanations of selective exposure assumed that individuals experiencing high confidence are

more likely than those experiencing low confidence, to try to reduce dissonance by examining discrepant material with the hope of refuting it. Accordingly, the following hypotheses are implied:

- (a) High Confidence results in higher ratings of interest in discrepant information than does Low Confidence.
- (b) High Confidence results in greater selection of discrepant information and longer examination of it than does Low Confidence.
- (c) High Confidence results in greater acquisition of discrepant information than does Low Confidence.

Hypothesis IV: Confidence is inversely related to the tendency of closed-minded persons to seek and acquire discrepant information and unrelated to the tendency of open-minded persons to seek and acquire discrepant information. In contrast to Hypothesis III, this hypothesis suggests that levels of confidence and levels of dogmatism interact to affect the differential selection of discrepant and congruent information. Because of their orientation toward authority, dogmatic individuals direct their search toward congruent information when high confidence has been induced. On the other hand, they seek discrepant information when low confidence has been induced. Open-minded persons, because of their task orientation, seek discrepant information under both levels of confidence. The following specific relationships were expected:

- (a) Under conditions of High Confidence, dogmatic persons rate interest in discrepant information higher and select, examine, and acquire more discrepant information than do dogmatic persons in the Low Confidence Condition.

- (b) Open-minded persons do not differ in their ratings of interest and selection, examination, and acquisition of discrepant information under conditions of High or Low Confidence.

Hypothesis V: Dogmatism, intolerance of ambiguity, and subjective certainty are inversely related to the selection and acquisition of discrepant information under conditions of doubt. Persons for whom new belief systems pose no threat (low dogmatism), who accept ambivalence (low intolerance of ambiguity), or who are more sensitive to the conflict imposed by competing responses (high subjective uncertainty) can cope with conflict by constructive means. In this case, the resolution of conflicting positions is attained most constructively by seeking as much information as possible on both sides of a question before making a choice. Accordingly, the following relationship was expected: Persons who are open-minded, tolerant of ambiguity, and subjectively uncertain rate discrepant information higher and select, examine, and acquire more discrepant information than persons with the opposite personality traits.

## CHAPTER III

### REVIEW OF THE LITERATURE

The intention of this chapter is to document assumptions described in the rationale and that underly the hypotheses of the present investigation. For this reason, the organization of this section parallels that of the previous chapter.

#### Information-Seeking and Uncertainty

Two related assumptions allow for the prediction that uncertainty leads to greater examination and retention of knowledge than does certainty. One is that uncertainty is a form of conflict that contributes to the state of curiosity and the other holds that curiosity is a drive-like condition which is reduced by the examination and acquisition of knowledge. Because of the latter assumption, the basic model of the present investigation is one of drive reduction. Berlyne (1960) distinguished two types of curiosity on the basis of this analysis: perceptual curiosity which is reduced by exposure to information-laden stimulus patterns and epistemic curiosity which requires the acquisition of knowledge for its reduction and is thus conceptual and symbolic in nature. Much of the interest of the present study is with epistemic curiosity.

The strength of perceptual or epistemic curiosity is influenced by the amount of conflict among competing responses, that is,

a) the number of competing responses, b) the equiprobability of the responses (relative response strength), c) the total absolute response strength and finally, d) the incompatibility of competing responses (Berlyne, 1960, 1962, 1965b). The first two of these factors defined the determinants of uncertainty. Thus, uncertainty is one of the elements within the broader construct of conflict that is assumed to produce curiosity.

Uncertainty and curiosity. A series of studies relate collative variables (e.g., surprise, novelty, complexity, and incongruity) to ratings of interest or measures of looking time or of fixation. These studies provide support for the proposition that uncertainty generates curiosity. Berlyne (1960), for example, argued that stimulus patterns containing collative properties arouse uncertainty, i.e., they increase the number and/or equiprobability of response alternatives. As an illustration, compared to simple figures, complex figures contain more component parts and a greater diversity of elements which have the effect of reducing redundancy, i.e., reducing the probability that knowledge of one element provides knowledge of the others. Thus, surprising, novel, complex, and incongruous patterns are stimuli which evoke the subjective state of uncertainty.

A variety of collative stimulus patterns have been shown to result in greater interest and longer examination, two indices of curiosity. Berlyne (1957) manipulated incongruity, complexity, and surprisingness of stimulus figures using simple line drawings that became prototypes of the stimulus materials of a number of later

experiments. For example, one stimulus figure depicted a lion's head mounted on the body of a camel (incongruity) while another pattern was a series of green dot figures followed by a design of purple squares (surprise). Manipulation of complexity included the highly redundant, low complex design of five evenly-spaced parallel straight lines, a moderately complex figure of two straight lines followed by three wavy lines all evenly-spaced, and finally a highly complex figure of five unevenly spaced lines none of which were the same. The S controlled tachistoscopic exposures at 0.14 second of the stimulus figures. A direct relationship was obtained between the number of exposures and the collative properties of the stimuli.

Berlyne and his associates conducted further experimentation that utilized stimulus materials similar to those described above. The experimental materials, designed to manipulate differences in specific collative properties, were comprised of pairs of similar figures, one of which was "less irregular" (lower in collative content) and one of which was "more irregular" (higher in collative content). In one study (Berlyne, 1963b), S examined tachistoscopic exposures of each pair of stimulus figures. After the times exposure to each pair, S selected one figure in the pair for further examination. When exposures were brief (0.5 or 1.0 seconds) stimulus patterns with collative properties were preferred over more redundant figures. However, with longer exposures (3.0 or 4.0 seconds), the less irregular figure was selected for further examination. Berlyne interprets these results as being consistent with the hypothesis that a collative stimulus pattern is examined to reduce the uncertainty

it produced. According to this view, the three or four second exposures were sufficient to reduce uncertainty while the smaller exposures were not.

In two additional experiments (Berlyne, 1958a, 1958b) the less irregular and more irregular figures were juxtapositioned and S's fixation on one or the other was measured. The results were consistent with previous findings; the amount of time spent in examining figures was related to the complexity of the figures. These general procedures were replicated with young children (Cantor, Cantor, and Detrichs, 1963; Smock and Holt, 1962) providing additional support for Berlyne's hypothesis. In addition, Leckart (1966), using procedures in which S controlled the time he looked at sequentially presented stimulus patterns, found that color slides of landscapes and objects that were judged more complex in an earlier experiment were examined longer than less complex slides.

Several experiments have attempted to distinguish the effects of collative variables on "interestingness" from their effects of "pleasingness" and, thus, provide more specific support for the relationship between uncertainty and curiosity. It was reasoned (Berlyne, 1963b; Day, 1968b) that because collative stimulus patterns require greater informational search to reduce uncertainty, they would be rated more interesting (i.e., more curiosity-producing) but not necessarily more pleasing. Eisenman (1966) found this to be the case. He reported a positive relationship between ratings of interest in polygon-shaped stimulus figures and their complexity and no relationship between ratings of pleasingness and complexity. Day (1967)

found that complexity correlated positively with ratings of interest but negatively with ratings of pleasingness. In a related experiment, Day (1968b) found that Ss who received the "interesting" instructional set spent more time examining complex slides than those who were given the "pleasing" instructional set.

The evidence relating uncertainty in the form of collative variables to perceptual curiosity is relatively consistent. There is less evidence relating uncertainty to epistemic curiosity. While it has been shown that collative stimuli produce uncertainty (Berlyne, 1960), the type of stimuli used in the previous experiments do not permit precise manipulation of the determinants of uncertainty, i.e., the number and equal probability of response alternatives. One study (Berlyne, 1962), however, was explicitly designed to test the effects of each determinant of uncertainty on epistemic curiosity. In that study, Ss were shown some quotations which were attributed to one of two plausible authors and others which were attributed to one of three authors (manipulation of number of alternative responses). Next to the name of each possible author was a number representing the percentage of experts (teachers) who were alleged to have selected that person as the actual source of the quotation. Equiprobability was manipulated by arranging the percentages either evenly or disproportionately across the names of the two or three alternative authors. The S's task was to select the 12 quotations whose true authors he most wanted to know and then to rank-order those he selected. Each S's Curiosity Score was computed on the basis of the rank he assigned to quotations which were associated with high (three authors with

even distribution), medium (two authors with even distribution or three authors with uneven distribution), or low (two authors with uneven distribution) levels of uncertainty.

The findings supported the hypothesized positive relationship between determinants of uncertainty and Curiosity Scores. Because most of the differences between treatments in the above experiment was found to be due to the number of alternatives, equiprobability was manipulated more extremely in a second study. The results reflected this change in treatment, thereby demonstrating a stronger effect of equiprobability on Curiosity Score. Berlyne concluded that while both the number of alternatives and their equal probability affect epistemic curiosity, the effects of the two determinants may not be identical.

In an early "exploratory" experiment, Berlyne (1954) examined the effects of epistemic curiosity produced by conceptual conflict (alternate symbolic response tendencies--thoughts, beliefs, attitudes) on the acquisition of knowledge. Experimental Ss received a list of 12 animals and were instructed to rate them for familiarity. They were then given a 48-item multiple choice test (pre-questionnaire) on the animals with instructions to answer the questions, to mark those that were most surprising and those that they wanted to know more about. All Ss were instructed to examine an answer sheet containing 72 statements including the correct answers to the pre-questionnaire. Finally, a post-questionnaire comprised of the same 48 questions in open-ended form was administered.

Berlyne explained the results in terms of his theory of epistemic curiosity. For example, one finding indicated that Ss expressed

greater interest in and recalled more information about familiar animals than about less familiar animals. Berlyne's explanation of this finding was that the symbolic responses associated with more familiar concepts were both more numerous and greater in total strength than symbolic responses associated with less familiar concepts. Therefore, familiar animals evoke increased symbolic response competition (epistemic curiosity) which was expressed in higher ratings of interest and which resulted in greater acquisition of knowledge than less familiar animals. Thus, one determinant of uncertainty, the number of response alternatives, was related to interest in and acquisition of knowledge. However, this factor was confounded with the total strength of the responses. An investigation that explicitly examines the effects of uncertainty on the acquisition of knowledge has yet to be conducted.

In summary, there is considerable support for the direct relationship between uncertainty, in the form of collative variables, and curiosity, as measured by reports of interest and by looking time. Experiments that specifically manipulate the determinants of uncertainty or examine the effect of uncertainty on the acquisition of knowledge are meager. Nevertheless, the effects of uncertainty on perceptual curiosity may be generalized to epistemic curiosity, and thus bolster the support for the assumption that uncertainty generates curiosity.

Curiosity as a drive-like condition. One argument supporting the second assumption (i.e., that curiosity is a drive-like state) is that people act as though they are under the effects of a curiosity

drive when faced with uncertainty-producing stimuli. One would deduce higher levels of interest and looking time from the intervening construct of curiosity. While such an argument is suggestive of a curiosity drive, it is also circular and, thus, inconclusive. That is, to measure curiosity drive by looking time, ratings of interest, or acquisition of knowledge and then to "explain" differences in these same behaviors in terms of curiosity drive actually explains little. Two ways of establishing the independence of a motivational variable such as curiosity are by defining the drive in terms of the effect of the subject's antecedent activities on dependent measures and by defining it in terms of organismic measures (Brown, 1961). There is some evidence establishing curiosity as a drive-like condition on both counts.

If curiosity is a drive, information that relieves curiosity has incentive value. That is, an individual will make instrumental responses to secure information. The strength of the incentive value of information depends, as it would for other incentives such as food, on the individual's past history with it. Accordingly, information deprivation should produce greater incentive value for information, and therefore, an increase in instrumental responses. Satiation of information should result in lower incentive value for information and less instrumental responses.

Jones (1961) controlled the information Ss received for a 12-hour period by placing them in a darkened room free of stimulation. The S was permitted to press a key that produced either a red or green flash on the ceiling of the experimental room. Because S was

not sure whether the flash would be red or green, the flash was assumed to contain information. The increase in response over the first 9 hours was highly significant; from the ninth to twelfth hour, there was a moderate drop in response. One interpretation of these data is that the increase in responses that provided information over the first nine hours indicated an increase in drive level due to the cumulative effects of information deprivation. Since these effects were not offset by the relatively meager amount of information provided by the light flash, the amount of responses increased over time. The drop in responses toward the end of the experimental session was assumed to be due to fatigue.

It could be claimed that the results of the above experiment were due to habit strength as well as or instead of drive; therefore, Jones (1961) conducted a second experiment. In this study, some Ss were not permitted to flash lights until they experienced one hour of information deprivation; others were required to wait five hours. If the number of responses was due to habit strength, both groups would have the same response rate for the first hour they were permitted to respond. If the number of responses was due to drive, the group with greater deprivation would make more responses. The results strongly supported the drive hypothesis.

If information gains incentive value due to deprivation, does it lose value due to satiation? There is some indication that it does. Leckart (1966) provided Ss with varying amounts of familiarization with color slides of landscapes. They were then able to examine the same slides as long as they wished. Leckart found that with familiarization the stimulus loses its capacity to elicit an exploratory

response. Moreover, after a delay of 48 hours the stimulus recovered this capacity, although recovery was incomplete. The amount of recovery was a function of the amount of initial familiarization.

The independence of the construct of a curiosity drive can be established by defining the drive in terms of organismic measures as well as defining it in terms of antecedent conditions such as deprivation or satiation. Berlyne likened drive to arousal and then related arousal to organismic measures.

More and more of the conditions that are recognized to involve increases in drive, e.g., sexual receptiveness, excess of carbon dioxide, hunger, thirst, and lack of sleep appear, in the light of accumulating data, to precipitate rises in arousal, as shown by direct probes of the activity of the reticular formation or by EEG and autonomic indices of arousal (Berlyne, 1963a, p. 308).

Berlyne conducted a series of experiments relating uncertainty to organismic changes. One of these (Berlyne, 1961) demonstrated a greater arousal effect, as measured by galvanic skin response (GSR), for words with highly uncertain associates than for words with highly certain associates. Berlyne, Crow, Salopotek, and Lewis (1963) tested the effects of collative properties on GSR. There was a decline in GSR with repeated exposures to the same stimuli, but GSR revived with the presentation of a new pattern. Moreover, the capacity of successive new patterns to elicit GSR diminished. This finding regarding GSR is reminiscent of Leckart's (1966) results for looking time. However, incongruous patterns, contrary to expectations, had no effect on GSR.

In a second experiment, Berlyne and Lawrence (1964) found no main effects on GSR due to collative stimulus properties and that the

rate at which GSR declined with successive stimulus presentations was not influenced by collative variables. More recently, Berlyne and McDonnell (1965) employed electroencephalography (EEG) to examine the effects of the same collative stimulus materials used in previous experiments. According to this measure, the investigators found results that were consistent with studies in which collative variables influenced looking time, choice of stimulus figures, and verbal expressions of interest. The authors concluded:

On the basis of this and previous experiments, we can put forward with fair confidence the view that collative stimulus properties influence arousal processes . . . . that such characteristics of the external environment as novelty, surprisingness and complexity can induce heightened drive independently of visceral needs and nociceptive events (Berlyne and McDonnell, 1965, p. 159).

#### Information-seeking and Selective Exposure

There is an intuitive appeal to the notion that individuals select the information to which they expose themselves and that one criterion for their selection is the extent to which the information agrees with beliefs they already hold. The selective exposure hypothesis (avoiding discrepant information and seeking congruent information) has emerged from the theory of cognitive dissonance (Festinger, 1957) and has received considerable empirical attention. In regard to the present investigation, selective exposure is assumed to be modified by factors such as confidence and utility. However, it is further assumed that for an individual free of such qualifying influences, selective exposure operates according to the tenets of cognitive dissonance theory. These two assumptions form the basis for the

predictions that certainty directs information-seeking toward the congruent position while uncertainty, particularly incongruity, and high confidence direct information-seeking toward the discrepant position. Research related to each assumption will be considered below.

The tenability of the selective exposure hypothesis. Selective exposure, according to the formulations of Festinger (1957), is a process by which an individual can reduce or avoid cognitive dissonance (conflict among cognitive elements). In spite of its wide applicability to diverse phenomena, dissonance theory itself has been described as a relatively simple construct, reducible to a small set of propositions (Festinger, 1957; Zajonc, 1968). Zajonc has listed the following propositions relevant to this discussion.

1. Cognitive dissonance is a noxious state.
2. In the case of cognitive dissonance the individual attempts to reduce or eliminate it and he acts so as to avoid events that will increase it.
3. In the case of consonance the individual acts so as to avoid dissonance-producing events.
4. If new cognitions are not added or the existing ones changed by means of passive processes, behaviors which have cognitive consequences favoring consonance will be recruited. Seeking new information is one example of such behavior (Zajonc, 1968, p. 360).

Thus conceived, selective seeking of congruent information and avoidance of discrepant information is one process for the reduction or elimination of the adverse condition created by opposing cognitive elements. Festinger (1957) cites modest support for this contention. One study compared the estimates made by Princeton and Dartmouth football fans of the amount of "rough and dirty" play in a hotly contested game. Dartmouth rooters (whose team, it seems, started the

rough play) tended to view the game as much less "dirty" than Princeton supporters (whose star player was injured). In regard to selective exposure, Dartmouth fans also reported seeing less infractions of the rules in a filmed version of the game. Festinger noted that student fans viewed the information in the film in a way that maintained consistency with their existing cognitions.

The remaining research Festinger (1957) presented in his original discussion of selective exposure is somewhat tangential to the issue of selective exposure. He noted that discrepant information is devalued more than congruent information and that it was forgotten more readily. Moreover, he demonstrated that a curvilinear relationship exists between the amount of dissonance and the seeking of new information. Similar results to those found in the latter complex study were obtained by Cohen, Brehm, and Latane (1959).

In their review, Freedman and Sears (1965) cite studies which support the selective exposure hypothesis. In several field studies, it was found that owners of relatively new cars preferred to read advertisements (congruent information) about their car than about other cars (Ehrlich, Guttman, Schonbach, and Mills, 1957); that mothers preferred information regarding child development that was consistent with their own views rather than information opposing their views (Adams, 1961); and that California voters preferred pamphlets endorsing their choice for governor (Freedman and Sears, 1963). Mills, Aronson, and Robinson (1959) gave Ss a choice between a multiple choice or essay test for a course in introductory psychology. When later given a choice of articles to read, Ss preferred those that were alleged to support their decision. However, there was no difference in

their preference for articles that criticized either the test they selected or the test they rejected. Rosen (1961) replicated the Mills, Aronson, and Robinson study, also finding support for the selection of articles alleged to supply information regarding the type of test S had selected. Rosen also included articles that indicated S had made the correct choice of tests (congruent articles) or that he had made the incorrect choice (discrepant articles). In regard to these articles, 67% of Ss chose the discrepant article.

Since the Freedman and Sears (1965) review was published, there have been other studies supporting the selective exposure proposition. Brock (1965) found that when Ss were led to believe they would actually read the articles, smokers selected articles indicating that smoking did not lead to lung cancer while non-smokers preferred articles which related smoking to lung cancer. In a later study, Brock and Balloun (1967) found that smokers worked harder to eliminate interference in a message that disputed the effect of smoking on lung cancer than one that linked smoking to lung cancer. The opposite tendency occurred for non-smokers.

Thus, evidence exists from field studies and laboratory research supporting the notion of selective exposure drawn from the theory of cognitive dissonance.

Modifications in the selective exposure hypothesis. Unfortunately, other data regarding selective exposure are not consistent with the findings described above thereby making it difficult to arrive at a final conclusion regarding the selective exposure hypothesis. The dilemma in this regard can be seen in the contradictory

statements of two investigators, as follows:

In summary, the current evidence concerning interest in supporting [i.e., information which supported the Ss existing beliefs] and discrepant information warrants the conclusion that people tend to seek out supporting information and avoid discrepant information (Mills, 1968, p. 775).

There is no empirical evidence indicating a general preference for supportive information over nonsupportive information. Regardless of whether the test is conducted under neutral, high-dissonance, or high-confidence conditions (Sears, 1968, p. 786).

Whether the hypothesis of selective exposure is a viable one has been questioned by a number of other investigators (Brehm and Cohen, 1962; Chapanis and Chapanis, 1964; Freedman and Sears, 1965; McGuire, 1968; Rhine, 1967). A reason for their skepticism is the inconsistency of the findings. Freedman and Sears (1965), for example, tallied five studies in which selective exposure was supported, five which produced negative results, and seven which were inconclusive.

Rhine (1967) suggested that inconsistent findings may be attributed to the possibility that the typical selective exposure study does not control the amount of dissonance created. Since the hypothesized relationship between the amount of dissonance and the amount of information-seeking is curvilinear, one would expect inconsistency in results among studies that do not control the amount of dissonance generated by the experimental conditions. For the same reason, it is difficult to compare the findings from various studies.

Festinger (1964) argued that selective exposure experiments are typically situations in which Ss are already in a state of dissonance (i.e., they know there is information that contradicts their position). Rather than avoiding possible dissonance, Ss were faced

with the problem of reducing existing dissonance. Thus, they can opt to examine discrepant information with the intention of refuting it and thereby reduce or eliminate the dissonant condition. Whether the S will make such a selection depends on his confidence in being able to refute the discrepant position.

In addition, Festinger contended that discrepant information may be selected because of its practical utility. Post hoc explanations based on the utility of the information have been made of both positive and negative findings (Canon, 1964; Freedman and Sears, 1965; Sears, 1968). That is, Ss were assumed to select information because it may help them raise their children (Adams 1961), get a good grade (Mills, Aronson, Robinson, 1959; Rosen, 1961), or preserve good health (Feather, 1962).

Canon (1964) explicitly designed an experiment to study the effects of utility and confidence on selective exposure. The Ss were led to believe that they were helping in the development of a business education course. Their "task" was to evaluate case studies being considered for inclusion in the course by selecting one of two alternative outcomes for each case study situation. The manipulation of confidence was accomplished by informing some Ss (low confidence) that their responses to the case studies were incorrect and that most Ss got the answers right. Other Ss (high confidence) were informed that their responses were correct and that most of the others were wrong. The Ss were then presented with a final case study to examine and told additional information about this case would be given to them. The "utility" of the information was manipulated by telling half of

the group of Ss they were to use the additional information to prepare for rebuttals against their conclusions in a debate on the case study (discrepant information useful). Other Ss were simply told that they would have to support their conclusion in a discussion (discrepant information not useful). The "additional information" was in the form of a list of articles that were congruent and discrepant with S's conclusion for the case study.

The main effects of both confidence and utility on the selection of articles were significant and supported Festinger's revisions of the notion of selective exposure. However, the results must be qualified by the fact that the induction of confidence was not found to be successful. Canon suggested that the failure to obtain evidence indicating that the manipulations were successful may be due to inadequacies in the rating scale used to measure confidence. In a replication by Freedman (1965a), Canon's results regarding utility were supported, but no differences in information-seeking were found between high and low confidence groups, even though Freedman was successful in inducing confidence. The effects of another variable, "certainty," (i.e., the operational equivalent of confidence) on information-seeking was investigated by Mills and Ross (1964) who were also unable to induce a manipulation similar to the one used by Canon and Freedman. These investigators found no differences in selective exposure between certain and uncertain groups, which they attributed to the failure of the experimental manipulation.

Unlike the findings regarding the effects of confidence on selection of information, the findings about the effects of practical

utility have been uniform (Canon, 1964; Freedman, 1965a). There are suggestions in the literature that information also may be sought because it is useful for the satisfaction of curiosity (Rhine, 1967). The rationale for the present investigations is based on the assumption that curiosity influences selective exposure, i.e., that discrepant information is sought when it is useful and that one such use is the reduction of curiosity. In fact, it may be that in a number of studies of selective exposure in which "negative" results were reported, discrepant information was sought to reduce curiosity; such information could be conceived of as having intrinsic utility. This would be particularly true when the S is presented with biased indoctrination (Sears, 1965) or one-sided communications (Freedman, 1965b; Sears, 1966) which prompt him to examine information on the "other side."

In noting that Brodbeck's (1956) results can be interpreted as negating the selective exposure hypothesis, Steiner (1962) suggests that "there are conditions which induce people to seek supportive information, and other conditions which create a susceptibility to adverse information" (p. 267). On the basis of the above review, there are indications that confidence and intrinsic utility may be two of these conditions.

#### Information-seeking and Individual Differences

Personality differences in cognitive inconsistency would be of interest even if selective exposure research itself was not plagued by inconsistent results. However, since the findings are inconclusive, consideration of individual differences may allow for sharpening

predictions regarding matters such as preference for congruent or discrepant information (Brehm and Cohen, 1962; Miller and Rokeach, 1968). Accordingly, the possible relationship of three personality traits (dogmatism, intolerance of ambiguity, and subjective uncertainty) to selective exposure will be examined.

Dogmatism. New belief systems are rejected by closed-minded persons because of the threat such individuals associate with beliefs that differ from their existing cognitive systems (Rokeach, 1960). One manifestation of the rejection of new beliefs by high dogmatics is the difficulty they experience in the synthesis (integration) phase of problem-solving where the problem-solver must replace one belief system with another. It follows that any situation in which an existing belief system is threatened by a new system, high dogmatics adhere to old systems and reject new systems more than do low dogmatics. Accordingly, high dogmatics are assumed to avoid information discrepant with existing belief systems and thereby learn less of it.

There is evidence that this is the case. High dogmatics were found to be more resistant to change in the face of changing stimulus conditions (White and Alter, 1965) and more resistant to a film ("Dr. Strangelove") opposing traditional conceptions of society (Rosenman, 1967). In a factor analysis of the items in several attitudinal tests, dogmatism was found to cluster on a factor involving the rejection of stimuli that threaten a person's existing beliefs (Pryor, 1966). Moreover, high dogmatics tend to either resist contradictory information or completely change their previous position to be congruent with the new beliefs, while low dogmatics tended to maintain

their existing beliefs and accept exposure to discrepant information (Foulkes and Foulkes, 1965).

Several studies have explicitly related dogmatism to the seeking and acquisition of discrepant information. Adams and Vidulich (1962) examined the effect of dogmatism and belief-congruence in paired-associate learning. The Ss were given 15 "belief-congruent" pairs (e.g., ball-round) and 15 "belief-incongruent" pairs (e.g., ball-square). In learning to a criterion of three errorless trials, high dogmatics made more errors when learning the incongruent list than when learning the congruent list and fewer errors when learning the congruent list than did low dogmatics. These results suggest the superior performance of high dogmatics when learning congruent information, an implication consistent with personality theory related to the behavior of open and closed-minded persons.

Kleck and Wheaton (1967) examined the effects of dogmatism on exposure to belief-congruent and belief-discrepant information. These investigators hypothesized that high dogmatics prefer belief-consistent information more than low dogmatics, recall less of the inconsistent information, and evaluate information inconsistent with their opinions less favorably. An experimental issue was selected for which most teen-age Ss agreed (the legal age for driving). Although S first chose between two fictitious newspaper articles which favored each side of the driving age issue, they were assigned both articles to read. The Ss evaluated the author, arguments, and validity of the conclusions of each article. Two weeks later, a test was administered composed of multiple choice items on both articles.

The results were consistent with Kleck and Wheaton's expectations. High dogmatics recalled significantly less of the discrepant article than low dogmatics and they were significantly higher in their evaluations of the congruent article. While dogmatics tended to display a greater preference for congruent information than open-minded Ss, the difference was not significant.

Clark and James (1967) employed three experimental conditions in which Ss were led to expect to prepare for a debate, to participate in a discussion, or simply to examine information privately in their home. All Ss were to select either belief-congruent or belief-discrepant articles. A positive correlation between dogmatism and the selection of congruent information was found only in the condition in which Ss were to examine the material privately.

Smith (1968) found results inconsistent with dogmatism theory. After indicating their position on a controversial topic (federal aid to Catholic schools) Ss were tested for their knowledge of "factual" arguments on both sides of the issue. They also indicated which of the statements they believed. While all Ss knew more supporting information than contradictory information, high dogmatics retained more facts contradictory to their opinions than low dogmatics. When Ss were divided according to the amount of interest they expressed in the issue, the same positive relationship between dogmatism and knowledge of discrepant information was found for high-interest Ss. Only among low-interest Ss was the prediction regarding dogmatism upheld; low dogmatics knew more discrepant facts than did high dogmatics.

Predictions regarding dogmatism failed to receive support from several studies that were not directly concerned with selective exposure. Feather (1964) presented Ss with 24 religious syllogisms (12 pro-religious and 12 anti-religious) as well as 16 neutral syllogisms. The Ss were instructed to judge the soundness of the arguments (half were valid and half were invalid). No correlation was found between the judged soundness of the pro-religious syllogisms and dogmatism, indicating that acceptance of congruent arguments was not affected by dogmatism. More recently, Hamilton (1969) found no relationship between dogmatism and the recall of discrepant information or the rejection of the source of the opposing viewpoint. Feather (1969) failed to obtain a relationship between dogmatism and the number of consistent and inconsistent arguments recalled.

Thus, while evidence strongly supports the hypothesis that dogmatism is directly related to selective exposure, some negative and inconclusive findings suggest cautious acceptance of that support.

Intolerance of ambiguity. Intolerance of ambiguity is a tendency to perceive ambiguous situations as threatening; tolerance of ambiguity is a tendency to view ambiguous situations as desirable (Budner, 1962). Budner characterized ambiguous situations as those marked by novelty, complexity, and insolvability. It is reasonable to consider a situation ambiguous when a particular phenomenon is associated with two possible explanations: one which the individual already holds and one which is new for him or discrepant with his existing beliefs. Under these circumstances, those who are intolerant of ambiguity are assumed to avoid discrepant information because it

is threatening while those who are tolerant of ambiguity are assumed to seek discrepant information because it is desirable.

There is little evidence relating intolerance of ambiguity to selective exposure. In one study described earlier (Feather, 1964), Ss judged the soundness of pro- and anti-religious syllogisms. When analyzed in terms of intolerance of ambiguity as measured by Budner's Test (1962), a positive correlation was found between intolerance and positive judgements of pro-religious syllogisms. Thus, the more intolerant of ambiguity the person was the stronger was his tendency to judge congruent arguments as correct even when those arguments were invalid.

Rosen (1961) replicated the investigation of selective exposure by Mills, Aronson, and Robinson (1959). Rosen added a personality dimension in the form of Pettigrew's (1958) Category-Width Scale, an instrument that can be construed as a measure of intolerance of ambiguity. In the case of males, Rosen found that preference for congruent information was inversely related to category width, a result consistent with the expectations of the effect of intolerance of ambiguity on selective exposure.

Although empirical support for the application of the intolerance of ambiguity construct to the selective exposure task is meager, the results obtained by Feather (1964) and Rosen (1961) are encouraging for the hypotheses of the present research.

Subjective uncertainty. Subjective uncertainty refers to the number and equiprobability of response alternatives a given stimulus evokes (Salomon and Sieber, 1969). Attempts to measure the predisposition to be uncertain usually require the individual to respond

to a variety of ambiguous situations and rate how certain he is of his response. Sieber (1969) described a crude measure of this sort used with young children. The Ss were asked to describe a detail of a familiar object that they had seen but had not examined closely. Then, Ss rated how certain they were of their description. Zajonc and Morrisette (1960) employed a technique to measure "subjective uncertainty" that was similar to Pettigrew's (1958) Category-Width Scale. The Ss estimated the number of bomb craters in an aerial photograph and then described the smallest range within which their estimate would be correct. Brian and Hoff (1957) developed a measure of "desire for certainty" consisting of 32 statements about everyday events. For example, Ss estimated how many Americans out of 100 believe in God and rated how sure they were of their answer. It was found that "desire for certainty" correlated with extreme response sets on attitudinal and judgmental instruments. As the above review suggests, attempts to measure subjective uncertainty have been made, however, subjective uncertainty has not been examined for its effects on selective exposure.

#### Summary

Considerable experimental evidence supports the assumption that uncertainty generates curiosity. Although most of this evidence related collative variables to perceptual curiosity, several studies have examined the effect of uncertainty on epistemic curiosity (Berlyne, 1962) and the effect of conceptual conflict on the acquisition of knowledge (Berlyne, 1954). Confidence and utility have also

been advanced as conditions which may influence the selection of discrepant information and help account for the inconsistent support for predictions of selective exposure based on dissonance theory. Research by Canon (1964) and Freedman (1965a), in particular, offered support for the utility hypothesis. Intrinsic utility, however, which may influence the selection of discrepant information has not been examined for its effects on selective exposure. The inconclusiveness of the findings regarding selective exposure may be attributed, in part, to individual differences. Especially relevant are three personality traits assumed to predispose an individual to select congruent or discrepant information--dogmatism, intolerance of ambiguity, and subjective uncertainty. While considerable evidence distinguished the selective exposure of open- and closed-minded persons (Kleck and Wheaton, 1967), and moderate evidence supported a similar distinction between those who differ in intolerance of ambiguity, the relationship between subjective uncertainty and selective exposure was untested.

## CHAPTER IV

### METHOD

This investigation was comprised of two experiments: a study of the effects of uncertainty on information-seeking and a study of the effects of the interaction between experimentally induced confidence and personality differences on information-seeking. The overall design for these experiments is represented in Figure 2.

#### Experiment I

The Ss in Experiment I were presented with a problem and a choice between two alternate outcomes. They were instructed to endorse one of the alternatives. The choice was designed to force S to select one alternative over the other. The experimental conditions were induced after S selected one of the alternative positions. Those Ss assigned to the Incongruity Treatment were presented only evidence that contradicted their decision. The Ss in the Doubt Treatment were provided evidence that contradicted and evidence that supported their choice of alternatives. The Certainty Treatment was induced by presenting Ss with only evidence that supported their decision. An absolute Control Group was employed. The Ss in this group were provided no evidence, one way or the other, about the validity of the position they chose.

Next Ss examined a series of slide-pairs. In the critical pairs, one slide contained information agreeing with the alternative

Experiment I

<b>INCONGRUITY</b> n=15 Presentation of contradictory evidence only.	<b>DOUBT</b> n=30 Presentation of both contradictory and supportive evidence.	<b>CERTAINTY</b> n = 15 Presentation of supportive evidence only.	<b>CONTROL</b> n=15 No presentation of evidence.
	<b>HIGH CONFIDENCE</b> n=30 Presentation of both contradictory and supportive evidence. High score on test.		
	<b>LOW CONFIDENCE</b> n = 30 Presentation of both contradictory and supportive evidence. Low score on test.		

Experiment II

Note Solid lines represent the cells of Experiment I. Dotted lines indicate the cells of Experiment II. Both experiments analyze data supplied by the Doubt Condition. Thus, the Doubt Cell is a treatment for Experiment I (one level of uncertainty) and a control for Experiment II (no confidence manipulation).

Figure 2. The relationship between  
Experiment I and Experiment II designs.

S had endorsed (congruent information) while the other slide disagreed with the choice S had made (discrepant information). The S's task was to turn off the less interesting of the two slides and to study the slide he considered more interesting. The slides S selected and the amount of time he examined them provided the basis for the dependent measures of interest and selective exposure. Self report measures of interest and a multiple choice test on the experimental topic were also employed.

The overall design for Experiment I implied a simple randomized analysis of variance with three uncertainty conditions (incongruity, doubt, and certainty) and one control condition.

Subjects. The Ss for Experiment I were 95 volunteers from an introductory undergraduate course in educational psychology at The Pennsylvania State University during the 1969 summer and fall terms. The Ss earned standard score points toward their grade in the course by participating in the experiment. A total of 20 Ss were eliminated for these reasons: four were dropped because of equipment malfunction; eight were eliminated because they had prior knowledge of the subject of the experimental materials; three were eliminated because of errors in administering instructions; and five were eliminated because they did not select the proper alternative at the outset of the experiment. Of the remaining 75 Ss, 29 were males and 46 were females.

There were 15 Ss assigned to each treatment. An additional 15 Ss were assigned to the Doubt Treatment because data from that

cell were also analyzed in Experiment II, where a larger sample ( $n = 30$ ) was required. The Ss were recruited from their regular class period and assigned to treatments by reference to a table of random digits prior to entering the experimental room. Randomization was recycled after each assignment of five Ss, one for each cell except the Doubt Condition which received two.

Stimulus Materials and Apparatus. The stimulus materials consisted of a series of slide-pairs depicting the Festinger-Carlsmith (1959) investigation of the cognitive effects of forced compliance. The use of the Festinger-Carlsmith research as subject matter for the present experiment has at least two advantages: common-sense explanations can be made according to two conflicting theories of attitude change (dissonance vs. reinforcement); and, the reinforcement position is almost unanimously invoked as an explanation of attitude change by relatively naive observers upon initial examination of the experimental results. Thus, information contained on slides depicting reinforcement theory was considered congruent with S's beliefs and information regarding dissonance theory was considered discrepant.

The slides within a pair were projected side-by-side on a single screen. The 30 pairs of slides were divided into three segments. The first segment described the Festinger-Carlsmith experimental procedures (seven pairs); the third segment presented the results of that experiment (seven pairs). Both slides in each pair of the first and third segments were identical, thereby enabling S to use the same

slide-changing routine throughout the experiment. Information contained on these slides provided a context for the critical slides that comprised the second segment. Since information about the results of the Festinger-Carlsmith research (third segment) also held the potential for reducing uncertainty, S's examination and acquisition of the information they contained was of interest as a dependent measure.

The 16 pairs of slides of the second segment each contained one congruent and one discrepant member that were balanced in length, form and content. The slides were titled to permit S to identify the content of the slide, but more important, to imply which slide in the pair was congruent and which was discrepant. For the sake of simplicity, items based on reinforcement theory were referred to as the "Law of Reward" and those based on dissonance theory were termed the "Theory of Conflict." Several examples of slide-pairs from the second segment are listed below; the complete list of experimental materials is included in the Appendix C.

Slide-pair number 8:

CONFLICT - DEFINITION

A conflict is created by a situation in which an individual acts inconsistently with his beliefs or attitudes. A person will usually try to reduce conflict.

REWARD - DEFINITION

A reward is an event or object that strengthens some behavior that it follows such as an attitude. A person will usually strive to get the reward.

Slide-pair number 15:

CONFLICT - EXAMPLE

He couldn't decide which of two identical twins to marry. However, after he proposed to Agatha, she seemed much more attractive than Martha.

REWARD - EXAMPLE

He couldn't decide which of two identical twins to marry. However, after he learned of her larger dowry, Agatha seemed much more attractive than Martha.

The slide pairs were rear-projected from two Kodak 900 carousel projectors on to a 6 in. x 12 in. translucent vinyl screen mounted on a 20 in. x 32 in. frame. Each carousel tray contained 30 slides; the eight congruent and eight discrepant slides of the second segment were randomly ordered to prevent either type from appearing consistently on one side of the screen (see Table 1 for list of slide titles). Every other slide slot in the carousel tray held a blank 2 x 2 inch cardboard square. As a result of this device, half of the screen remained dark after S turned off what he considered the less interesting slide in the set and while he examined the more interesting one.

The apparatus depicted in Figure 3 was designed to record the time spent in viewing each slide by S. The S's responses were recorded via an eight-channel Gerbrands event recorder powered by a 24 volt power supply. An example of a record is shown in Figure 4. The event-recorder was also connected to an interval and repeat-cycle timer which allowed two second intervals to be recorded on the tape.

The apparatus was simply arranged to allow access to the projector control buttons and to the screen without viewing E or the operation of the event recorder (Figure 3). The two projector control buttons were immediately before the S at the table's edge and the screen was located behind the control buttons.

Procedures. At least two weeks prior to the experimental sessions, a test battery that included the personality measures used in this investigation was administered to the subject pool. The procedures of the experimental sessions includes an introduction to the slide-changing routine, the elicitation of an overt opinion

Table 1  
MEASURES OF DEPENDENT VARIABLES' ACCORDING TO TYPE OF MEASURE EMPLOYED

Variable Measured	Type of Measure		
	Self reports	Latency and Choice	Multiple Choice Test
Information-seeking	Total interest in Reward and Conflict slides	Examination Time	Total Test Score
			Sub-score on results of Festinger-Carlsmith experiment
Selective Exposure	Interest in Reward or Conflict slides	Discrepant Slide Choice	Sub-scores on Reward and Conflict positions.
	Interest in Reward or Conflict articles	D/E Ratio	
	Amount of Conflict between Reward and Conflict positions	Reaction Time	
Experimental Manipulation			

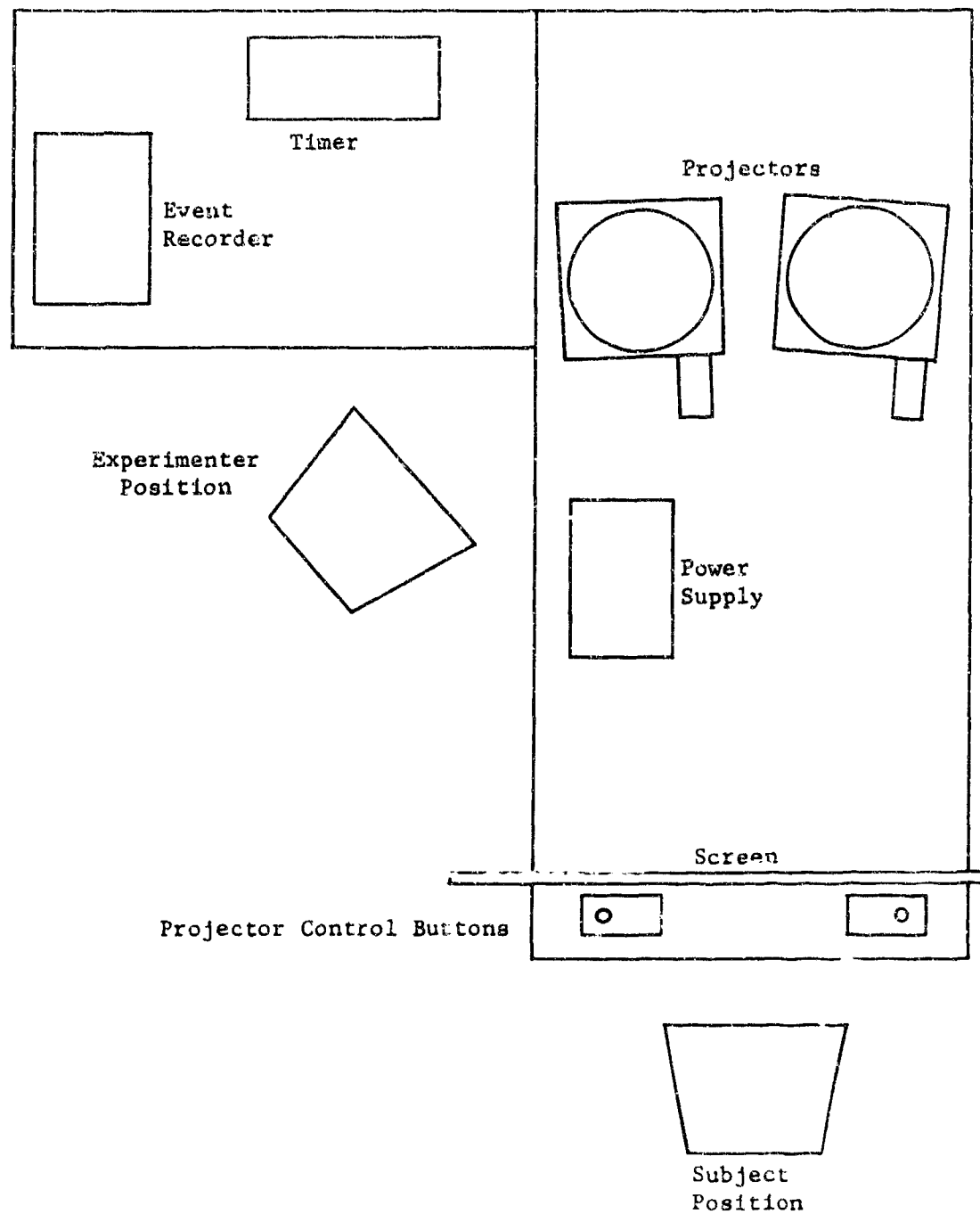


Figure 3. Position of apparatus in experimental room.

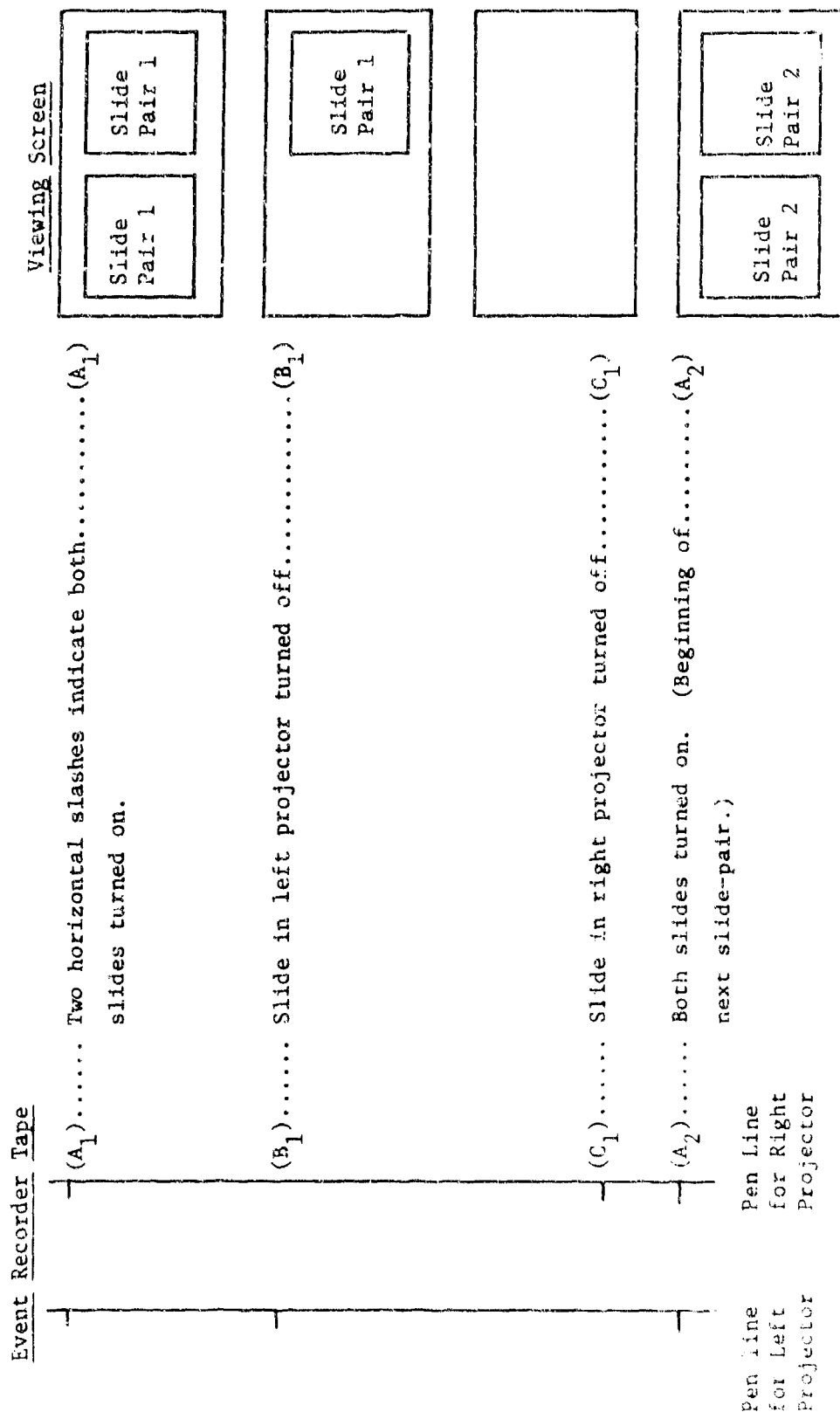


Figure 4. Responses registered on event recorder tape for the examination of a typical slide-pair.

supporting the reinforcement theory explanation of attitude change, and finally, the experimental manipulations.

1. Introduction. Upon being seated in a position from which he could view the slides (Figure 3), the S was given a brief overview of the tasks he was to perform and practice in the slide-changing routine. The routine (Figure 4) consisted of simultaneously presenting two slides on the screen by depressing both projector control buttons when the screen was blank; turning off the less interesting slide; examining the remaining slide for an indefinite interval; and, finally, turning it off to reveal a blank screen. Thus, the blank screen signalled the end of one slide-pair or trial and the beginning of the next. Since there were no time constraints, S was free to set his own pace in examining the slides and could spend as much time as he needed to look at both slides before identifying the less interesting one. However, it was emphasized that as soon as he decided to choose one slide over the other, the less preferred slide must be immediately turned off. It was suggested that his decision might be made after simply looking at the slide titles.

Because S was led to believe that he would not be tested on the slide content, the task of examining the slides requires a plausible explanation. Accordingly, Ss were told that the Es were preparing instructional materials on the topic of attitude change and that Ss could help them by identifying what they considered the most interesting slides. Since it was stressed that only S's actual personal

preferences would be useful to E, this brief cover story lent plausibility to the experimental task while it minimized the opportunity for dissonance reduction.

2. Elicitation of opinion. The purpose of this phase of the instructions was to elicit a commitment from S to the reinforcement position. The introduction included a description of a "typical" attitude change experiment which was, in reality, a version of an experiment reported by Brehm and Cohen (1962). In the illustration, Ss were given payments ranging from 50 cents to ten dollars for their participation in an experiment which required them to misrepresent their beliefs. The Ss in the present experiment were asked, "Which payment do you think would be most effective in getting a person to change his beliefs or attitudes to be in line with the misrepresentation--the large payment of ten dollars or the small payment of 50 cents?" The E listened carefully to S's responses and recorded it with S's view together with the comment, "Let me mark that down." An explanation was then provided to the effect that the Brehm and Cohen experiment dealt with the effect of reward on attitude change. The S then rated his confidence about his own prediction regarding the outcomes of the Brehm and Cohen study on a 100 point scale. These data were not needed for the purposes of Experiment I, however, they were used as a measure of the induction of confidence for Experiment II and therefore were collected from all Ss in both experiments.

The Brehm and Cohen experiment was chosen because the reinforcement and dissonance interpretations applicable to it were also clearly applicable to the Festinger-Carlsmith experiment. Thus, when

Ss selected the larger payment (i.e., the reinforcement position) in the Brehm-Cohen study, it was presumed that they were committed to the larger payment in the Festinger-Carlsmith experiment.

3. Treatments. The experimental manipulations were intended to induce the conditions of Incongruity, Doubt, or Certainty. The Ss in the Incongruity Condition were presented only with evidence that contradicted their selection of the large payment (i.e., the evidence supported dissonance theory) on the assumption that response competition would be generated. Support for dissonance theory was provided through a direct reproduction of pages 76 and 77 of Brehm and Cohen's (1962) Explorations in Cognitive Dissonance. These pages contained a table of experimental findings which demonstrated that the smaller the payment, the greater the attitude change. In the induction of Incongruity, the S's attention was directed to this table as well as to the statement on the same pages, ". . . dissonance and consequent attitude change vary inversely with the amount of incentive for taking a stand discrepant with one's cognitions." It was also made clear to S that these results were the opposite of those he predicted and that they supported the "Theory of Conflict" rather than the "Law of Reward."

The Ss in the Certainty Condition were presented only with "evidence" that agreed with their selection of the large payment (i.e., with reinforcement theory) on the assumption that supporting evidence would minimize response competition. The evidence upholding reinforcement theory was contrived by manipulating a histogram presented in a report by Festinger (1962) in the Scientific American. The original

figure displayed results very similar to those found by Brehm and Cohen. However, for the present study, the groups' labels were reversed to indicate that the greater the payment, the greater the attitude change. The revised chart was then inserted into a copy of a study reported by Scott (1966) entitled, "Attitude Change through Reward of Verbal Behavior." The Ss in the Certainty Condition had their attention drawn to the chart and the title of the article. It was emphasized that these results supported their predictions and that the "Law of Reward" rather than the "Theory of Conflict" was unmistakably supported by the research evidence.

The Ss in the Doubt Condition were presented with the same bogus Scott article given Certainty Ss as well as the same reproduction of the Brehm and Cohen study shown to the Incongruity Ss. In addition, the Ss in the Doubt Treatment had their attention directed to the same portions of each article that were underscored for the Incongruity and Certainty Ss. It was emphasized that the Scott study supported their predictions and the "Law of Reward" while the Brehm-Cohen experiment contradicted their predictions and supported the "Theory of Conflict."

A fourth group, the Control Condition, was given the same introduction as the experimental Ss and their opinions of the effect of payment size on attitude change were also elicited before they examined the stimulus materials. They differed from the experimental Ss only in that they received neither supporting nor contradictory evidence.

4. Debriefing. The debriefing session assessed S's prior knowledge of the experimental topic and provided an opportunity to explain the deceptions employed in the experiment. The S was asked if he knew anything about cognitive dissonance before participating in the experiment. If S responded positively, he was asked to write a brief definition which provided the basis for eliminating Ss from the experiment. Finally, Ss were asked if they were aware of the deceptions included in the instructions to the experiment. Since all Ss were either incorrect or unaware of deceptions, E described the purpose of the experiment and explained the nature of the experimental deceptions.

Measures. Measures of information-seeking and selective exposure were required to test the hypotheses of the present investigation. Additional measures were employed to ascertain the success of the experimental manipulations. In order to assess the amount of information-seeking and selective exposure that occurred, three types of measures were constructed: self reports of interest and opinion, latency and choice measures, and a multiple choice test of the experimental topic. On Table 2, the various measures have been classified by type for each dependent variable. The description that follows is organized according to the type of measure employed; that is, the organization follows the columns of Table 2.

1. Self report measures. The Ss rated their interest in reward slides (congruent information) and conflict slides (discrepant information) on 100 point scales. For example, Ss were instructed

Table 2  
ORDER OF SLIDE-PAIR PRESENTATION

Slide-Pair Number	Slide Title in Left Projector	Slide Title in Right Projector
1	Description of Experiment	Description of Experiment
2	Description of Experiment	Description of Experiment
3	Description of Experiment	Description of Experiment
4	Description of Experiment	Description of Experiment
5	Description of Experiment	Description of Experiment
6	Description of Experiment	Description of Experiment
7	Description of Experiment	Description of Experiment
8	Conflict-Definition	Reward-Definition
9	Reward-Proponents	Conflict-Proponents
10	Reward-Proponents	Conflict-Proponents
11	Conflict-Assumptions	Reward-Assumptions
12	Reward-Assumptions	Conflict-Assumptions
13	Conflict-Example	Reward-Example
14	Conflict-Example	Reward-Example
15	Reward-Example	Conflict-Example
16	Reward-Example	Conflict-Example
17	Conflict-Rationale	Reward-Rationale
18	Reward-Rationale	Conflict-Rationale
19	Conflict-Rationale	Reward-Rationale
20	Conflict-Rationale	Reward-Rationale
21	Reward-Rationale	Conflict-Rationale
22	Reward-Predictions	Conflict-Predictions
23	Conflict-Predictions	Reward-Predictions
24	Results	Results
25	Results	Results
26	Results	Results
27	Results	Results
28	Results	Results
29	Results	Results
30	Results	Results

to respond to the question, "How interesting did you find the slides entitled 'Conflict'?" by placing an "x" at the point along the scale which represented their degree of interest. It was assumed that interest in the general topic was reflected in the total ratings recorded on both the reward and conflict scales. The individual scales provided a measure of selective exposure (i.e., the S's interest in either reward or conflict slides).

Typically, measures of selective exposure record the S's intention to read articles that either agree or disagree with his existing beliefs (Freedman and Sears, 1965). This procedure was employed in the present experiment by requiring S to rate six "reprints from psychological journals" according to his interest in each article with "not interesting" at one extreme and "very interesting" at the other (Appendix D). For this purpose, a 100 point scale was placed below each of the relatively simple, descriptive titles. The two articles supporting the reward explanation of attitude change were balanced in form with two articles upholding the conflict explanation. There were two neutral articles which referred to attitude change without mentioning either the reward or conflict positions. Examples of each type of article are listed below.

Beck, Ralph C. "Reward and Reinforcement Produce a Change of Beliefs." (Congruent information)

Lippitt, Neal B. "Attitude Formation Processes." (Neutral information)

Dobbs, Charles R. "Conflict and Dissonance as a Cause of Attitude Change." (Discrepant information)

In order to make the task of rating the articles a credible one, S was told that additional data for this experiment would be

collected later in the term. The S was further instructed that it would be necessary for him to read a brief article on the topic of attitude change before the additional data were collected. Accordingly, S was directed to select a title from the list of six reprints by rating his interest in each. Furthermore, S was cautioned that there may not be enough reprints for everyone to receive his first or even second choice; therefore, he should be sure his highest ratings included those in which he was most interested. Ratings of the two conflict articles, two neutral articles, and two reward articles were averaged for each S, providing a measure of selective exposure.

An opinion scale was constructed to assess the success of the induction of uncertainty. The Ss were asked to indicate the extent to which they felt the conflict and reward slides were contradictory (i.e., the amount of response competition they experienced). A 100 point scale with "no conflict" at one extreme and "extreme conflict" at the other was employed to record the amount of conflict Ss felt existed between the two theoretical positions.

2. Measures of latency and choice of discrepant slides. The Gerbrands event recorder provided measures of the time required to select either the reward or conflict slide (Reaction Time) and the time devoted to examination of the chosen slide (Examination Time). The spacings of the horizontal slashes on the event recorder tape were interpreted as measures of Reaction Time (the distance between Point A and Point B in Figure 4) and Examination Time (the distance between Point B and Point C in Figure 4). Reaction and Examination Times were computed by converting the distance between horizontal

slashes into seconds on a scale on which each 1/16 inch interval represented one half of a second. Reaction Time was assumed to be a measure of response competition (Berlyne, 1960) while Examination Time was assumed to be a measure of observation.

Since differences may exist between S's intention to examine information and his actual examination (Sears, 1968), two additional measures of selective exposure were obtained: the Discrepant Slide Choice and the D/E Ratio. The 16 pairs of congruent and discrepant slides afforded S 16 opportunities to select or avoid discrepant information. Discrepant Slide Choice was computed by determining whether the first flash mark in the event recorder tape (Point B, Figure 4) represented a congruent slide, indicating that the discrepant slide remained on the screen. Since S may have selected the discrepant slide more often than the congruent slide but spent less time examining it, a ratio was computed to provide a measure of the time S spent examining discrepant information. The D/E Ratio consisted of the following analysis of Examination Time.

$$\text{D/E Ratio} = \frac{\text{Discrepant Time (Time spent examining only discrepant information)}}{\text{Examination Time (Time spent examining both congruent and discrepant information)}}$$

3. Retention of information. The Ss' knowledge of the topic was measured by 33 multiple choice items (see Appendix D). This test of retention was scored to provide a total test score and part scores for knowledge of congruent information (nine items), for knowledge of discrepant information (seven items), for knowledge of both discrepant and congruent information (seven items), and for knowledge

of the results of the Festinger-Carlsmith investigation as depicted on the slides (six items).

### Experiment II

The experimental materials, apparatus, procedures, and measures for Experiment II were identical to those of the Doubt Condition of Experiment I (see Figure 2). The distinguishing features of Experiment II are described below.

Subjects. The 104 Pennsylvania State University undergraduates who participated in Experiment II during the summer and fall terms of 1969 were drawn from an introductory course in educational psychology as well as several other education courses. Of these Ss, 11 were discarded for the following reasons: data on individual differences were unavailable, prior knowledge of the experimental topic, and equipment malfunction. In addition, three Ss were randomly dropped to maintain equal cell sizes. For the 90 Ss included in the analyses, 31 were male and 59 were female. A total of 65 educational psychology students received credit toward their grade by participating in the experiment; the remaining 25 Ss were recruited during the summer term from other education courses. For 14 of these Ss, participation in the experiment was included as a part of their course requirements; the remaining 11 Ss were not required to participate nor did they receive compensation.

Randomization procedures for the summer differed from those of the fall. During the summer, Ss from courses other than educational

psychology were assigned to the High Confidence (12 Ss) and Low Confidence (13 Ss) Conditions. However, Ss recruited from the introductory course in educational psychology were assigned to the Doubt Condition (i.e., the control for Experiment II) as a part of the randomization procedures for Experiment I. During the fall term, when all Ss were drawn from the educational psychology course, they were assigned proportionately to the six conditions which comprised the two experiments. Accordingly, randomization was recycled after each assignment of nine Ss. The Incongruity, Certainty, and Control Conditions of Experiment I each received one S while two Ss were assigned to the Doubt, High Confidence, and Low Confidence Conditions.

Measures. A concern in Experiment II was the effect of the interaction between aptitude and treatment on information-seeking. Accordingly, the Dogmatism Scale, Form E (Rokeach, 1960), the Scale of Tolerance-Intolerance of Ambiguity (Budner, 1962), and an Uncertainty Scale specifically designed for the purpose of this experiment (see Appendix A) were administered to the Ss. These tests were selected because of the hypothesized relationship between the constructs each is assumed to measure and the dependent variable of information-seeking.

The Uncertainty Scale, in particular, was designed to measure the amount of response competition generated by Ss when faced with a problematic situation. Specifically, it was assumed that Ss who were "completely certain" of one of two equally wrong choices regarding a

variety of topics such as the relative size of the American and Russian populations would also be certain of their point of view regarding the experimental topic of this study, i.e., the effect of reward on attitude change. The scale included items which were constructed to represent the experimental situation of the Doubt Treatment (e.g., Given two messages from equally reliable sources, I'd rather study details of the one that is similar to my position. To what extent do you agree?). Thus, the Uncertainty Scale was task-specific in that it required Ss to behave in a manner similar to the requirements of the experimental conditions.

Procedures. Manipulation of confidence occurred before Ss were presented with the supportive or contradictory evidence which comprised the Doubt manipulation. As indicated in the description of the procedures for Experiment I, the induction of High and Low Confidence was achieved by the administration of a test supposedly designed to measure "intuitive understanding of attitude change." The "test" consisted of three hypothetical situations which were presented as actual experiments on attitude change reported in psychological journals (see Appendix B). Brief descriptions of the "experiments" were read aloud to each S who was also given two alternate outcomes and instructed to predict the correct one. The situations were sufficiently ambiguous that either alternative could be considered correct. High Confidence Ss were told that they were correct on all three questions. Low Confidence Ss were informed that their first answer was correct, but that they missed the last two "important" questions.

During the testing session a bogus "Matrix for Computing Intuitive Test Scores" was placed in S's view (see Appendix B). After answering all the questions, this form was used to "compute" S's percentile rank. High Confidence Ss were reported to be in the 93rd percentile while Low Confidence Ss were reported to be in the 11th percentile.

The overall effects of the Confidence Treatments (High Confidence, Doubt, and Low Confidence) on selective exposure were tested by a single factor analysis of variance. In order to test the interaction between dogmatism and confidence on measures of selective exposure, a regression analysis was conducted. Finally, correlations between dogmatism, intolerance of ambiguity, and subjective uncertainty and the dependent measures of selective exposure were computed.

## CHAPTER V

### RESULTS

The findings of Experiment I and Experiment II are presented separately and related to relevant hypotheses.

#### Experiment I

An  $F_{\max}$  test of the assumption of homogeneity of variance for the four conditions of Experiment I was made for each dependent variable. The largest number of Ss in the treatment groups ( $n = 30$ ) was used in determining the degrees of freedom, thereby providing a positive bias. The ( $p < .05$ ) level of significance was exceeded only for measures of Examination Time ( $F_{\max} (3,71) = 4.62$ ) and knowledge of congruent information ( $F_{\max} (3,71) = 2.78$ ). Departures of this magnitude from the assumption of homogeneity were not considered sufficiently great to seriously affect the sampling distribution of the  $F$  statistic (Wimer, 1962).

In order to determine the success of the experimental manipulations, Ss were instructed to rate the amount of conflict present in pairs of slides showing congruent and discrepant information. The analysis of variance of responses on the self report measures of induction yielded  $F(3,71) = 2.04$ ,  $p > .05$ . The means for the groups represented in this analysis are summarized in Table 3. Although the overall analysis indicated that the differences were not significant

Table 3

INDUCTION OF EXPERIMENTAL MANIPULATIONS: MEANS AND STANDARD  
 DEVIATIONS FOR AMOUNT OF CONFLICT REPORTED BETWEEN  
 SLIDES OF EACH SET AND REACTION TIME FOR THE  
 16 SEGMENT II SLIDE-PAIRS

Kind of Measure	Experimental Condition				$\bar{F}$ value
	Incongruity (n = 15)	Doubt (n = 30)	Control (n = 15)	Certainty (n = 15)	
Reported Conflict $\bar{X}$ (100 point scale) SD	74.80 21.31	74.10 21.41	59.33 19.00	58.47 24.83	2.02
Reaction Time $\bar{X}$ (in seconds for 16 slide-pairs) SD	155.73 95.12	235.25 148.43	165.47 112.05	184.80 113.51	1.82

at the traditionally accepted level of ( $p = .05$ ), the data shown in that table are in the expected direction, suggesting successful induction of the experimental manipulations. In both uncertainty conditions ( $\bar{X} = 74.80$  for Incongruity and  $\bar{X} = 74.10$  for Doubt) Ss reported greater conflict between congruent and discrepant slides than Control Ss ( $\bar{X} = 69.33$ ), while Ss in the Certainty Condition ( $\bar{X} = 58.47$ ) reported less conflict. The findings regarding Reaction Time (Table 3) as a measure of response competition and, thus, uncertainty, were neither reliable nor in the expected direction, although Reaction Time for the Doubt Condition was the greatest.

Hypothesis I: Uncertainty is directly related to the tendency to initiate and maintain information-seeking behavior with consequent increases in acquisition of knowledge. Findings relevant to Hypothesis I are displayed on Table 4. They are based on measures of interest, examination, and knowledge acquisition. The measure of general interest in task-relevant information was obtained by summing interest reported in congruent and discrepant slides. Although the Doubt Condition ratings, as predicted, were highest ( $\bar{X} = 132.10$ ), the relatively high ratings of the Certainty Condition ( $\bar{X} = 126.47$ ) and the low ratings of the Incongruity Condition ( $\bar{X} = 116.27$ ) were not consistent with the expectations of Hypothesis I. The differences among these means were not reliable ( $p > .05$ ) according to the single factor analysis of variance which was conducted.

The analysis of variance of Examination Time devoted to slides pairing congruent and discrepant information (Segment II slides) yielded  $F(3,71) = 3.46$ ,  $p < .025$ . In both uncertainty conditions

Table 4  
MEANS AND STANDARD DEVIATIONS FOR AMOUNT OF INTEREST,  
EXAMINATION, AND ACQUISITION OF KNOWLEDGE

Kind of Measure	Experimental Condition				F value <sup>a</sup>
	Incongruity (n = 15)	Doubt (n = 30)	Control (n = 15)	Certainty (n = 15)	
Interest in con- gruent and dis- crepant slides (200 point scale)	$\bar{X}$ 116.27 SD 22.17	132.10 30.38	124.73 35.65	126.47 23.21	1.02
Examination time for pairs of con- gruent and discre- pant slides (in seconds)	$\bar{X}$ 158.33 SD 55.88	126.98 70.21	101.70 66.67	93.50 35.01	3.46*
Examination time for pairs describ- ing Festinger- Carlsmith results (in seconds)	$\bar{X}$ 97.17 SD 34.10	89.32 46.27	81.97 25.67	78.20 25.62	.79
Test Score (items correct)	$\bar{X}$ 18.67 SD 4.03	20.47 3.45	17.40 3.40	14.93 3.95	8.05**
Test Sub-score for Festinger- Carlsmith results (items correct)	$\bar{X}$ 4.13 SD 1.36	3.57 1.07	3.07 1.28	3.27 1.10	2.33

<sup>a</sup> F value of 2.74 for  $p = .05$

\*  $p < .05$

\*\*  $p < .01$

( $\bar{X} = 126.98$  for Doubt and  $\bar{X} = 158.33$  for Incongruity), Ss spent more time than those in the Control Condition ( $\bar{X} = 101.70$ ) examining the slide they selected as more interesting while Ss in the Certainty Condition ( $\bar{X} = 93.50$ ) spent less time than the Control Ss. In order to test pairwise differences among the means, Dunn's relatively stringent a priori procedures were used in this and other analyses. The use of an a priori test was justified by the directional nature of the hypotheses. Dunn's procedure was selected because it permitted non-orthogonal comparisons among groups of unequal size and because of the protection it afforded against Type I errors (Kirk, 1968). The results obtained from the analysis based on Dunn's procedure indicated that Examination Times for the Incongruity Condition were significantly longer than those for the Certainty Condition. The examination of pairs of identical slides which depicted the results of the Festinger-Carlsmith experiment (Segment III slides) was similar to the Examination Times for Segment II, but the differences in this case were not significant ( $p > .05$ ). The means of the Incongruity, Doubt, Control, and Certainty Conditions were  $\bar{X} = 97.17$ ,  $\bar{X} = 89.32$ ,  $\bar{X} = 81.97$ , and  $\bar{X} = 78.20$  respectively.

The analysis of data provided by the multiple choice test of the experimental topic yielded  $F(3,71) = 8.05$ ,  $p < .001$ , suggesting a tendency for uncertain Ss to acquire more task-relevant information than Certain Ss. The test scores for the Ss in the two uncertainty conditions ( $\bar{X} = 20.47$  for Doubt and  $\bar{X} = 18.76$  for Incongruity) were higher than the Control ( $\bar{X} = 17.40$ ) and the Certainty Conditions ( $\bar{X} = 14.93$ ). Both the Doubt and the Incongruity Conditions had

higher scores than the Certainty Condition ( $p < .05$ ) according to Dunn's procedures.

In summary, the results obtained from self report measures of interest were unreliable and, except for the high ratings of interest in the Doubt Condition, the findings were not in the predicted direction. However, the SS' observational behavior was consistent with Hypothesis I. This was particularly true for Segment II slides which contained information explaining the congruent and discrepant beliefs. The direction of the differences among the means for the test scores was similar to the direction obtained for measures of Examination Time, implying additional support for Hypothesis I. In fact, the test score results offered stronger support for Hypothesis I in that both uncertainty conditions differed significantly from the Certainty Condition.

Hypothesis II: Uncertainty is directly related to the tendency to seek information about a position discrepant to one's own beliefs, and as a consequence to increases in acquisition of knowledge about the discrepant position. Selective exposure was measured by the selection of articles for future reading which agreed (congruent) or disagreed (discrepant) with S's existing beliefs, the interest reported in congruent or discrepant slides, the Discrepant Slide Choice (DSC), the time spent examining discrepant slides (D/E Ratio), and finally, the acquisition of information about the congruent or discrepant positions. The findings obtained by each dependent measure will be examined in turn.

The data displayed on Table 5 summarizes the ratings of interest in reading articles which are congruent or discrepant with a belief S holds or which are unrelated to that belief (i.e., neutral articles). Since neutral articles neither supported nor contradicted S's existing beliefs, there was no reason to expect differences in the ratings of these articles across treatments. A single factor analysis of variance yielded no significant differences among the treatment groups ( $p > .05$ ). However, congruent articles tended to be rated more interesting by Certainty Ss ( $\bar{X} = 77.33$ ) than by uncertain Ss ( $\bar{X} = 61.07$  for Incongruity and  $\bar{X} = 68.40$  for Doubt). A single factor analysis of variance for the selection of congruent articles yielded  $F(3,71) = 3.65$ ,  $p < .025$ . Discrepant articles tended to be rated more interesting by Ss in the Incongruity ( $\bar{X} = 70.73$ ) and Doubt Conditions ( $\bar{X} = 67.53$ ) than by Ss in the Certainty Condition ( $\bar{X} = 59.53$ ), although these differences were less reliable ( $F(3,71) = 1.74$ ,  $p > .05$ ) than those for congruent articles. These findings, which were consistent with Hypothesis II, implied an interaction between type of article and level of uncertainty.

In order to specifically test the hypothesized disordinal interaction a procedure described by Hays (1963, p. 465) was used as follows:

$$t = \frac{(+1\bar{X}_{11} - 1\bar{X}_{12}) - (+1\bar{X}_{21} + 1\bar{X}_{22})}{\sqrt{MS_{\text{error within}} \left( \sum \frac{C^2}{n} \right)}}$$

where " $\bar{X}$ " represents the mean for the groups included in the comparison, " $C$ " represents the coefficient, and " $n$ " the number of

Table 5  
 MEANS AND STANDARD DEVIATIONS FOR SELF REPORT RATING  
 OF CONGRUENT, NEUTRAL, AND DISCREPANT ARTICLES  
 (100 Point Scale was Used)

Kind of Article		Experimental Condition				F Value
		Incongruity (n = 15)	Doubt (n = 30)	Certainty (n = 15)	Control (n = 15)	
Congruent	$\bar{X}$	61.07	68.40	77.33	74.67	3.65*
	SD	19.27	14.60	13.24	11.31	
Neutral	$\bar{X}$	66.20	63.37	59.60	60.33	.41
	SD	20.91	20.27	15.70	13.33	
Discrepant	$\bar{X}$	70.73	67.53	59.53	56.73	1.74
	SD	23.15	20.53	21.69	13.79	

\*  $p < .05$ .

observations in each group.

The results of this analysis yielded  $t(142) = 16.44$ ,  $p < .001$  which offered explicit support for the prediction of a disordinal interaction (see Figure 5a). In order to determine the locus of the interaction,  $t$  tests of the differences between means were conducted. The analysis of preferences for congruent or discrepant articles in the Certainty Condition yielded  $t(71) = 2.53$ ,  $p < .02$ , in which congruent articles were rated higher than discrepant articles. An analysis of the difference between conditions in their preference for congruent information yielded  $t(142) = 2.58$ ,  $p < .02$ , suggesting that Ss in the Certainty Condition rated congruent articles higher than those in the Incongruity Condition.

These data imply that the effect of incongruity is to direct information seeking, expressed in the choice of intended reading, away from congruent information and toward discrepant information while certainty has the opposite effect. There were no such strong directional effects in the Doubt Condition, where relatively high interest was reported for the selection of articles which were both congruent and discrepant with the S's initial position. These effects may be seen in the means summarized in Table 5. Furthermore, while interest in congruent and discrepant articles varied according to experimental treatments, there were no differences among the conditions in the selection of neutral articles.

Analyses of reported interest in slides which contained information congruent or discrepant with S's existing beliefs yielded results consistent with data regarding the selection of articles. These

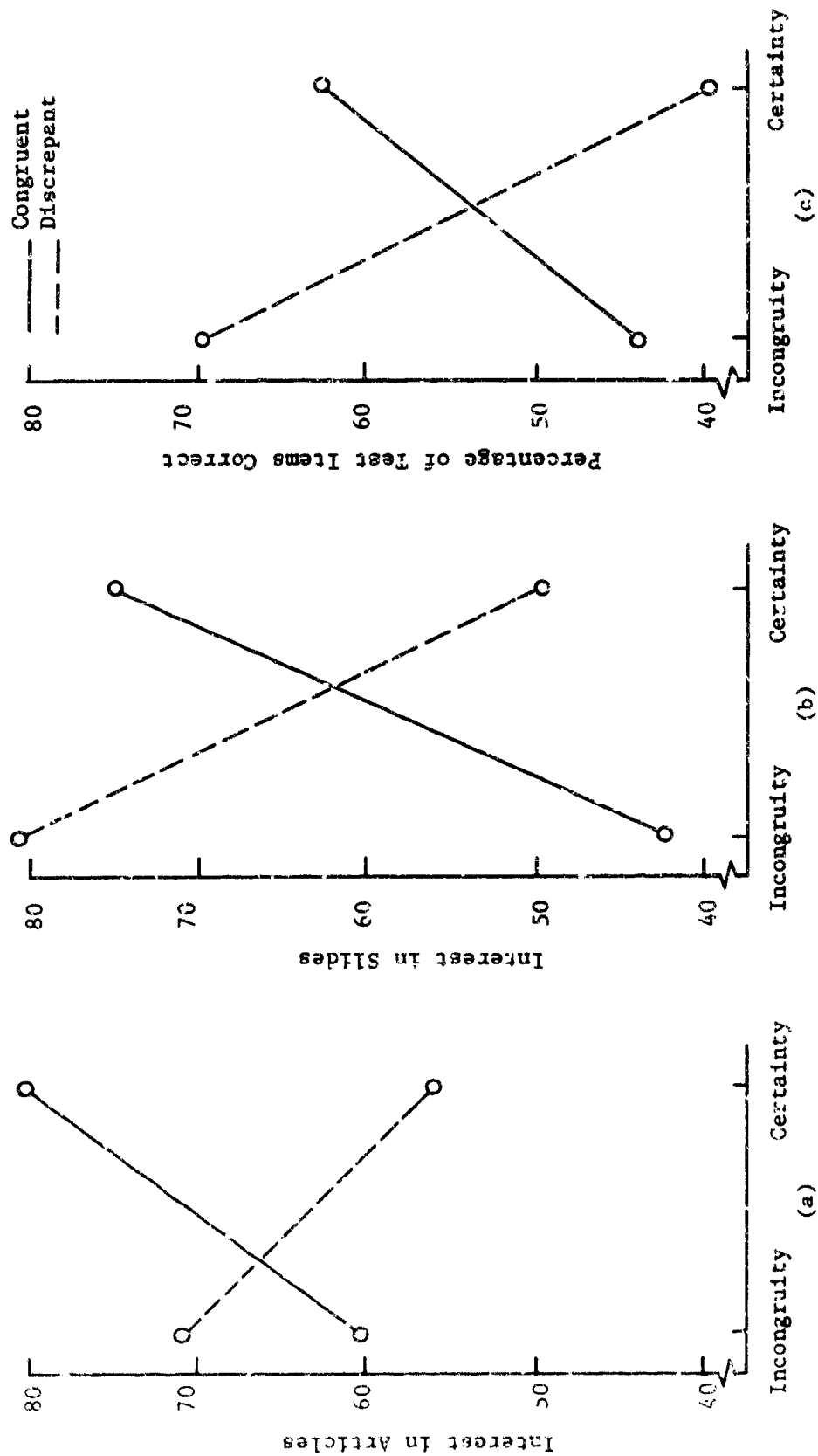


Figure 5. The effect of Incongruity and Certainty on interest and acquisition of congruent and discrepant information.

data are summarized in Table 6. An analysis of variance of interest in congruent slides yielded  $F(3,71) = 5.98, p < .005$ , in which Certainty  $Ss$  ( $\bar{X} = 75.13$ ) rated the congruent slides higher than Incongruently  $Ss$  ( $\bar{X} = 43.00$ ). A similar analysis of interest in discrepant slides yielded  $F(3,71) = 3.58, p < .025$  in which Incongruity  $Ss$  ( $\bar{X} = 79.93$ ) rated discrepant slides higher than Certainty  $Ss$  ( $\bar{X} = 51.33$ ).

Using the procedures described above (Hays, 1963), a specific analysis was made of the hypothesized interaction between treatments (Incongruity and Certainty) and interest (congruent or discrepant slides). This analysis yielded  $t(71) = 11.61, p < .001$ . These findings, which implied support for Hypothesis II, are displayed in Figure 5b. Furthermore, all  $t$  tests of the differences between the extreme points of the interaction were significant. The analysis of interest in congruent slides yielded  $t(71) = 3.23, p < .01$ , implying higher ratings of interest in the Incongruity than in the Certainty Conditions. The analysis of interest in discrepant slides yielded  $t(71) = 2.88, p < .01$ , implying that the discrepant slides were of more interest to  $Ss$  in the Incongruity Condition than to those in the Certainty Condition. An analysis was made to determine whether  $Ss$  in the Incongruity Condition preferred one type of slide over the other. This analysis yielded  $t(71) = 4.52, p < .001$ , implying a preference for discrepant slides. A similar analysis of the Certainty Condition yielded  $t(71) = 2.91, p < .01$ , implying preference for congruent slides.

Data obtained by the Discrepant Slide Choice (DSC) and D/E Ratio measures are summarized in Table 7. The DSC provided  $Ss$  with

Table 6  
 MEANS AND STANDARD DEVIATIONS FOR SELF REPORT  
 INTEREST IN CONGRUENT AND DISCREPANT SLIDES  
 (100 Point Scale Was Used)

Kind of Slide		Experimental Condition				F value
		Incongruity (n = 15)	Doubt (n = 30)	Certainty (n = 15)	Control (n = 15)	
Congruent	$\bar{X}$	63.00	63.40	75.13	62.47	5.89**
	SD	26.99	24.81	13.94	16.69	
Discrepant	$\bar{X}$	79.93	68.70	51.33	55.27	3.58*
	SD	29.87	25.06	27.74	28.34	

\*  $p < .05$

\*\*  $p < .01$

Table 7  
MEANS AND STANDARD DEVIATIONS FOR  
CHOICE AND EXAMINATION OF DISCREPANT SLIDES

Kind of Measure		Experimental Condition				F value
		Incongruity (n = 15)	Doubt (n = 30)	Control (n = 15)	Certainty (n = 15)	
Choice of Discre- pant Slides	$\bar{X}$	12.07	6.43	6.20	5.26	5.50*
	SD	4.95	5.49	4.53	5.36	
D/E Ratio	$\bar{X}$	.76	.40	.36	.34	5.28*
	SD	.31	.36	.29	.35	

\*  $p < .01$

16 opportunities to select a congruent or discrepant slide. The analysis of the selection of discrepant slides yielded  $F(3,71) = 5.50$ ,  $p < .005$  and the analysis of the D/E Ratio or time spent examining discrepant slides yielded  $F(3,71) = 5.28$ ,  $p < .01$ . The differences among the means were in the predicted direction and consistent with the findings based on interest scales. The greatest DSC ( $\bar{X} = 12.07$ ) and D/E Ratio ( $\bar{X} = .76$ ) occurred in the Incongruity Condition while the smallest DSC ( $\bar{X} = 5.26$ ) and D/E Ratio ( $\bar{X} = .34$ ) were obtained in the Certainty Condition. Analyses of pairwise comparisons of both measures using Dunn's procedures, indicated that each treatment mean differed from the Incongruity Treatment ( $p < .05$ ) while none of the remaining treatments differed significantly from each other.

The scores from three sections of the multiple choice test of the experimental materials were converted to percentages to permit comparison. They are summarized in Table 8. The analysis of variance for scores on the seven-item set of questions requiring both congruent and discrepant information yielded  $F(3,71) = 2.88$ ,  $p < .05$ . The scores of the Doubt Condition ( $\bar{X} = 60.47$ ), as predicted, were higher than the other experimental treatments ( $\bar{X} = 52.33$  for Incongruity and  $\bar{X} = 57.13$  for Certainty). An analysis of pairwise comparisons using Dunn's procedures revealed that none of these differences was significant. Analysis of the nine-item set which measured retention of congruent information yielded  $F(3,71) = 3.31$ ,  $p < .05$  in which Certainty  $S_s$  ( $\bar{X} = 59.20$ ) had higher scores than Incongruity  $S_s$  ( $\bar{X} = 45.13$ ). In contrast, the analysis of the seven-item set which measured retention of discrepant information yielded  $F(3,71) = 7.98$ ,  $p < .001$  in which Incongruity  $S_s$  ( $\bar{X} = 67.60$ ) scored higher than Certainty  $S_s$  ( $\bar{X} = 37.07$ ).

Table 8  
MEANS AND STANDARD DEVIATIONS FOR PERCENTAGE OF  
TEST ITEMS CORRECT FOR SUB-SCORES REQUIRING KNOWLEDGE  
OF CONGRUENT, DISCREPANT, AND BOTH CONGRUENT  
AND DISCREPANT INFORMATION

Kind of Test Item	Experimental Condition				F value
	Incongruity (n = 15)	Doubt (n = 30)	Certainty (n = 15)	Control (n = 15)	
Required congruent information (n = 9)	$\bar{A}$ 45.13 SD 20.97	62.63 19.42	59.20 25.99	48.07 15.22	3.31*
Required congruent and discrepant in- formation (n = 7)	$\bar{X}$ 52.33 SD 19.10	60.47 23.63	57.13 22.23	41.00 17.66	2.88*
Required discre- pant information (n = 7)	$\bar{X}$ 67.60 SD 20.54	64.80 21.73	37.07 25.07	41.93 25.52	7.98**

\*  $p < .05$

\*\*  $p < .01$

Since these results implied an interaction between levels of uncertainty and kind of information retained, an analysis was made using the procedures described above (Hays, 1963). This analysis yielded  $t(142) = 10.81$ ,  $p < .001$ , suggesting support for Hypothesis II. The relationship among these variables is presented in Figure 5c. In order to identify which relationships in the interaction were significant,  $t$  tests of differences between the extreme points were made. In the analysis of retention of congruent information, which yielded  $t(142) = 1.81$ ,  $p < .10$ , the mean of the Incongruity Condition was lower than that of the Certainty Condition. The analysis of the retention of discrepant information yielded  $t(142) = 3.93$ ,  $p < .001$ . In contrast to the retention of congruent information, the mean for retention of discrepant information in the Incongruity Condition was higher than that of the Certainty Condition. An analysis was made to determine whether Ss in the Incongruity Condition retained more congruent or discrepant information. This analysis yielded  $t(71) = 2.75$ ,  $p < .01$ , in which more discrepant information was retained than congruent information. A similar analysis of the Certainty Condition yielded  $t(71) = 2.70$ ,  $p < .01$ , in which more congruent information was retained than discrepant information.

In summary, Incongruity and Certainty were inversely related to the selection, examination, and acquisition of congruent and discrepant information. According to the above findings, when an individual was faced with stimulus conditions which were incongruous, his seeking and acquisition of knowledge were directed toward discrepant information. When the stimulus conditions were certain, he tended to seek and acquire congruent information. The effect of doubt was less directional

and more "balanced" in that it tended to produce relatively high levels of interest and acquisition. The findings obtained from all measures of selective exposure were consistent in the support they implied for Hypothesis II.

### Experiment II

The  $F_{\max}$  tests of the assumptions of homogeneity of variance were made for each dependent measure of Experiment II. In no case was the ratio significant ( $p < .05$ ), thus, the assumption of homogeneity was considered met.

In order to determine the success of the experimental manipulations, Ss were asked to describe the confidence they had in their ability to make judgements on the topic of the experimental materials. The Ss rated their confidence immediately after the confidence manipulation but before the examination of the slides and again at the end of the experiment. Their ratings are summarized in Table 9. An analysis of the differences among the groups for the first rating of confidence yielded  $F(2,87) = 41.84$ ,  $p < .001$ . Multiple comparisons revealed significant differences ( $p < .05$ ) between the Control ( $\bar{X} = 66.63$ ) and the High Confidence Condition ( $\bar{X} = 80.37$ ) and the Control and the Low Confidence Condition ( $\bar{X} = 41.53$ ). The analysis of the post-experimental confidence measure yielded  $F(2,87) = 10.34$ ,  $p < .001$ . A pairwise comparison between the means revealed that High Confidence Ss ( $\bar{X} = 81.43$ ) maintained their high degree of assurance, while Low Confidence Ss ( $\bar{X} = 63.50$ ) raised their confidence to a level equal to that of the Control Ss ( $\bar{X} = 63.57$ ). These data imply that while

Table 9  
 MEANS AND STANDARD DEVIATIONS FOR AMOUNT OF  
 CONFIDENCE REPORTED BEFORE AND AFTER  
 EXAMINATION OF SLIDE-PAIRS  
 (Ratings made on 100 point Scale)

Kind of Rating	Experimental Condition			F value
	High Confidence (n = 30)	Doubt (Control) (n = 30)	Low Confidence (n = 30)	
Confidence before examining slides	$\bar{X}$ 80.37 SD 9.74	66.63 16.23	41.53 21.81	42.84*
Confidence after examining slides	$\bar{X}$ 81.43 SD 12.86	63.57 18.22	63.50 20.78	10.34*

\*  $p < .01$

the differences in confidence were more extreme at the outset of the experiment, the experimental induction was maintained throughout S's experience in the experiment.

Hypothesis III: High confidence is directly related to the examination and acquisition of knowledge about discrepant information.

The findings obtained by all measures of selective exposure provided little, if any, endorsement of this hypothesis. These data are summarized on Tables 10, 11, 12, and 13. According to analyses based on self reports of interest in articles or slides, there were no significant differences ( $p > .05$ ) in selective exposure to congruent or discrepant information. In the one instance in which significance was approached, i.e., in the analysis of interest in congruent slides which yielded  $F(2,87) = 2.75$ ,  $p < .10$ , High Confidence Ss reported higher ratings ( $\bar{X} = 74.33$ ) than Low Confidence Ss ( $\bar{X} = 59.73$ ) contrary to the expectations of Hypothesis III.

The selection of discrepant slides (DSC) and the time spent examining them (D/E Ratio) did not differ across treatment groups. An analysis of the acquisition of discrepant information yielded  $F(2,87) = 4.23$ ,  $p < .025$ , and another on the retention of knowledge requiring both congruent and discrepant information yielded  $F(2,87) = 3.28$ ,  $p < .05$ . However, these differences are due to variations of both confidence conditions from the Control Condition rather than any differences between the confidence conditions themselves (Table 13). Thus, the direction of the differences offer no support for Hypothesis III.

Table 10  
 MEANS AND STANDARD DEVIATIONS FOR SELECTION  
 OF CONGRUENT, NEUTRAL, AND DISCREPANT ARTICLES  
 (Ratings Made on 100 Point Scale)

Kind of Article		Experimental Condition			F value
		High Confidence (n = 30)	Doubt (Control) (n = 30)	Low Confidence (n = 30)	
Congruent	$\bar{X}$	70.97	68.40	64.67	.81
	SD	20.60	14.60	21.62	
Neutral	$\bar{X}$	69.30	63.37	63.50	.75
	SD	17.84	20.27	21.25	
Discrepant	$\bar{X}$	68.03	67.53	65.17	.21
	SD	15.89	20.53	17.74	

Table 11.  
 MEANS AND STANDARD DEVIATIONS FOR REPORTED INTEREST  
 IN CONGRUENT AND DISCREPANT SLIDES  
 (Ratings Made on 100 Point Scale)

Kind of Slide		Experimental Condition			F value
		High Confidence (n = 30)	Doubt (Control) (n = 30)	Low Confidence (n = 30)	
Congruent	$\bar{X}$	74.33	63.40	59.73	2.75
	SD	24.96	24.81	25.47	
Discrepant	$\bar{X}$	67.33	68.70	59.50	1.06
	SD	27.32	25.07	26.79	

Table 12  
 MEANS AND STANDARD DEVIATIONS FOR  
 CHOICE AND EXAMINATION OF DISCREPANT SLIDES

Measure		Experimental Condition			F Value
		High Confidence (n = 30)	Doubt (Control) (n = 30)	Low Confidence (n = 30)	
Discrepant Slide Choice	$\bar{X}$	6.60	6.43	8.00	.74
	SD	5.24	5.49	5.69	
D/E Ratio	$\bar{X}$	.41	.40	.52	.85
	SD	.34	.36	.36	

Table 13  
 MEANS AND STANDARD DEVIATIONS FOR NUMBER OF ITEMS  
 CORRECT REQUIRING KNOWLEDGE OF CONGRUENT,  
 DISCREPANT, OR BOTH CONGRUENT AND DISCREPANT INFORMATION

Kind of Test Item	Experimental Condition			F value
	High Confidence (n = 30)	Doubt (Control) (n = 30)	Low Confidence (n = 30)	
Required congru- ent information (n = 9)	$\bar{X}$ 4.97 SD 1.81	5.63 1.73	5.47 1.53	1.26
Required congru- ent and discrep- ant information (n = 7)	$\bar{X}$ 3.33 SD 1.42	4.23 1.65	3.33 1.63	3.28*
Required discrep- ant information (n = 7)	$\bar{X}$ 3.30 SD 1.70	4.53 1.53	3.83 1.70	4.23*

\*  $p < .05$

Hypothesis IV: Confidence is inversely related to the tendency of closed-minded persons to seek and acquire discrepant information and unrelated to the tendency of open-minded persons to seek and acquire discrepant information. Since the interest of Hypothesis IV centered on the interaction between dogmatism and confidence, the dogmatism scores of the three treatment groups of Experiment II were examined. The mean dogmatism scores for the Control, High Confidence, and Low Confidence groups were  $\bar{X} = 137.83$ ,  $\bar{X} = 140.37$ , and  $\bar{X} = 135.27$  respectively. An analysis of variance of the dogmatism scores yielded  $F < 1$ . Accordingly, differences in selective exposure between the treatment groups cannot be attributed to differences in dogmatism.

Hypothesis IV implied an interaction between dogmatism and confidence in which the seeking and acquisition of discrepant information by high dogmatics is differentiated by levels of experimentally induced confidence. This hypothesized interaction was tested by a regression analysis in which: (a) dogmatism was considered the independent variable and the seeking and acquisition of discrepant information were the dependent variables; (b) regression lines reflecting the relationship between the independent and dependent variables were determined for each of the three treatment groups of Experiment II; and (c) the parallelism of regression lines was tested by an  $F$  ratio to determine the extent of the interaction. The presentation of results which follows will describe the relationship among the regression lines for ratings of interest in articles and slides, the number of discrepant slides chosen, the time spent examining the discrepant slides, and the acquisition of discrepant information.

The test for parallelism of regression for dogmatism and interest in discrepant slides and dogmatism and interest in discrepant articles both yielded  $F < 1$ , suggesting that the interaction between dogmatism and confidence was not obtained. According to the hypothesis, one would expect a positive slope for the Low Confidence regression line and a negative slope for the High Confidence regression line which join at a point along the abscissa which represents the lower extreme of the Dogmatism Scale (see Figure 6a). The slopes of the regression lines for interest in discrepant articles were not consistent with Hypothesis IV as suggested by the following correlation coefficients:  $r = -.09$  for Control,  $r = .08$  for High Confidence, and  $r = .17$  for Low Confidence. Similar trends were obtained for ratings of interest in discrepant slides ( $r = .00$  for Control,  $r = .10$  for High Confidence, and  $r = .31$  for Low Confidence). Only the positive slope of the regression line for the Low Confidence Condition is suggestive of support for Hypothesis IV. That is, there was a tendency for closed-minded Ss to rate discrepant slides higher than open-minded Ss. In addition, the positive slope of the Low Confidence regression line suggests that by extending the range of the dogmatism scores to the upper limits of the scale, high dogmatics may differ in their preference for discrepant slides under conditions of High or Low Confidence.

Although the test for parallelism of regression lines between dogmatism and the dependent variables of selection (DSC), examination (D/F Ratio), and acquisition of discrepant information yielded  $F$  ratios which were not significant ( $p > .05$ ), the slopes of the regression lines for the three dependent variables were similar and approximate the direction predicted by Hypothesis IV (Figures 6 and 7).

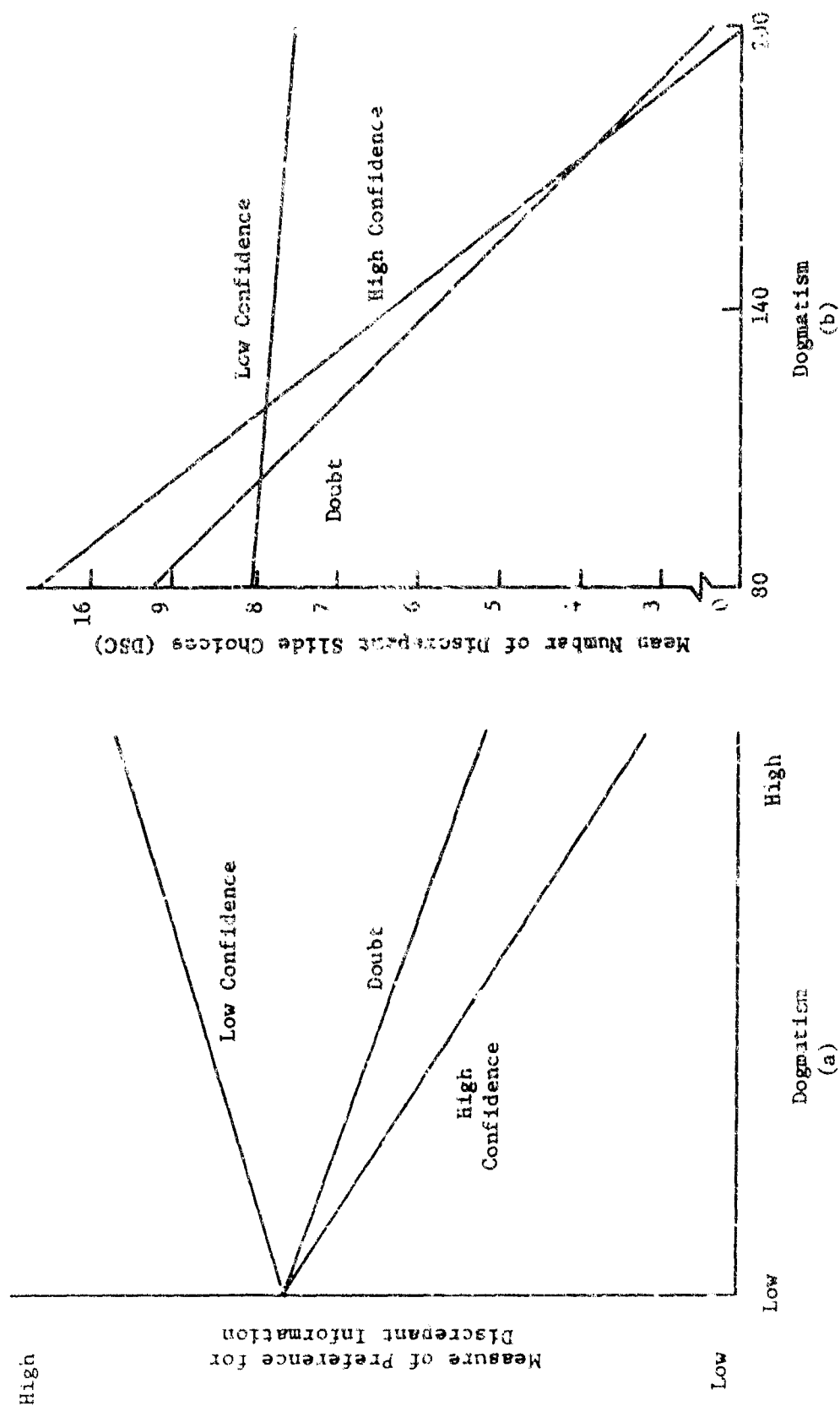


Figure 6. Regression lines describing the hypothesized relationship between dogmatism and preference for discrepant information and the obtained relationship between dogmatism and discrepant slide choice.

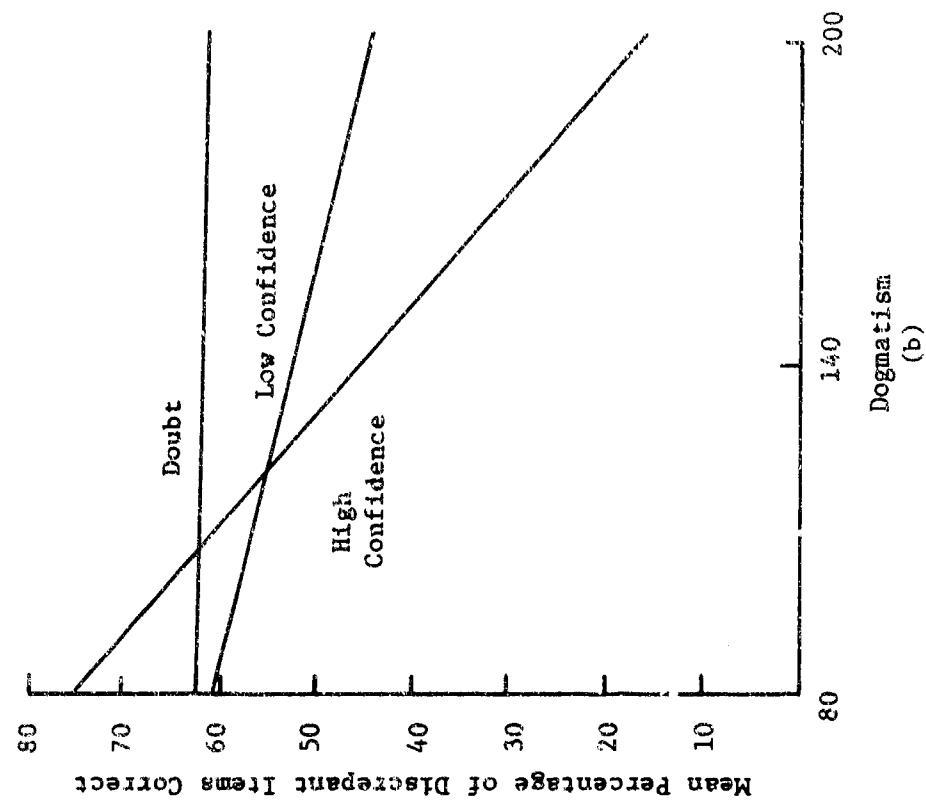
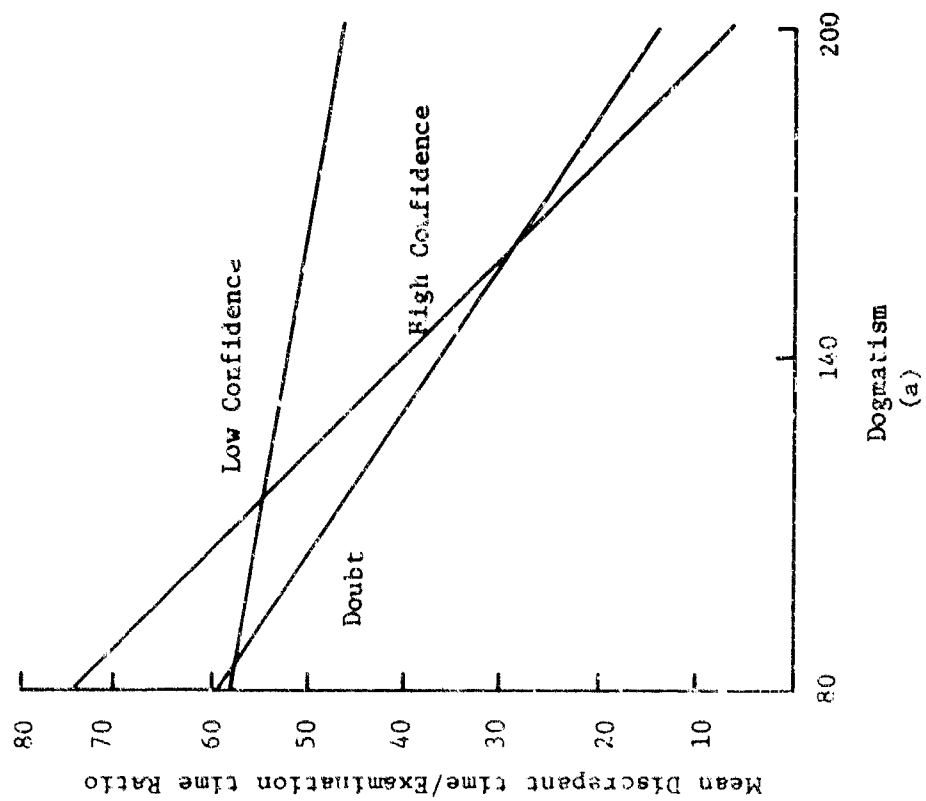


Figure 7. Regression lines describing the relationship between dogmatism and the D/E Ratio and dogmatism and the percentage of discrepant items correct.

On the three dependent measures, open-minded Ss were apparently unaffected by the confidence manipulation. However, the slopes of the regression lines imply a tendency for closed-minded Ss to be differentially affected by variations in experimentally induced confidence in a direction consistent with Hypothesis IV; namely, there is greater examination and acquisition of discrepant information in the Low Confidence Condition than in the High Confidence Condition.

Because the slopes of the regression lines suggested support for Hypothesis IV, but the F ratios were not significant ( $p > .05$ ), a post hoc analysis of the data was conducted. In order to increase the reliability of the measures, the scores for DSC, D/E Ratio, and discrepant items correct were combined by transforming them to T scores and summing them to arrive at a total standard score. The regression lines resulting from this analysis were consistent with the previous analyses, however, the transformations failed to yield significant differences in the slopes of the regression lines.

The present data do not warrant acceptance of Hypothesis IV. However, they do suggest a tendency which is consistent with the predictions and which may be obtained more reliably under different experimental conditions.

Hypothesis V: Dogmatism, intolerance of ambiguity, and subjective certainty are inversely related to the selection and acquisition of discrepant information under conditions of doubt. The correlations between the measures of selective exposure and the S's ratings of the three personality scales used in this investigation are displayed in Table 14. A significant relationship ( $p < .05$ ) was not

Table 14  
 CORRELATION COEFFICIENTS BETWEEN RATINGS ON  
 PERSONALITY SCALES AND MEASURES OF SELECTIVE EXPOSURE

Dependent Measure	Personality Scale		
	Dogmatism	Intolerance of Ambiguity	Subjective Uncertainty
Discrepant Items Correct	.00	-.42*	.42*
Interest in Discrepant Slides	-.07	-.02	-.17
Interest in Discrepant Articles	.02	-.23	.04
D/E Ratio	-.19	-.23	.06
Discrepant Slide Choice	-.20	-.18	.09

\*  $p < .01$

obtained between dogmatism and any of the measures of selective exposure. Hypothesis V, however, was supported by the reliable relationship ( $p < .01$ ) obtained between both subjective uncertainty and intolerance of ambiguity and the acquisition of discrepant information.

## CHAPTER VI

### DISCUSSION

The results are interpreted in each section of this chapter in terms of their consistency with theories and findings related to uncertainty, curiosity, selective exposure, and the various personality scales that were employed. Applications of the findings to instructional settings are proposed in sub-sections entitled, instructional implications. Because these applications extend the findings beyond the relatively controlled laboratory conditions in which they were obtained, they are speculative in nature.

#### The Effects of Uncertainty on Interest, Examination, and Acquisition of Knowledge

The expectation that uncertainty produces greater search and acquisition of knowledge than certainty (Hypothesis I) is based on the assumption that competing responses generate a state of epistemic curiosity and that the reduction in the number and/or equality of competing responses reinforces learning. Findings regarding the time spent examining the chosen slide of each slide-pair (Examination Time) and the test scores which reflected the acquisition of knowledge of the general topic appear to support Hypothesis I. The Ss in both the Incongruity and Doubt Conditions had higher test scores than the Ss in the Control Condition and were significantly superior to those of the Certainty Condition. A similar trend occurred when Examination Time

for slide-pairs which presented congruent information on one member and discrepant information on the other (Segment II) was employed as a dependent measure. Examination Time was longer for Ss in the Incongruity and Doubt Conditions than for those in the Control Condition while Examination Times for Ss in the Certainty Condition was less than for those in the Control Group.

The above results are consistent with theories of epistemic curiosity (Berlyne, 1960, 1963, and 1965b) and with a previous finding in which information which was assumed to reduce curiosity was acquired (Berlyne, 1954). Epistemic curiosity has been conceived of as a "motivational state (a state of high drive or arousal) that activates quests for knowledge and is relieved by the acquisition of knowledge" (Berlyne, 1962, p. 27). The quest for knowledge (epistemic behaviors) sometimes assumes the form of observation which may result in the reduction of uncertainty by the acquisition of new knowledge. The findings of the present experiment can be interpreted within this theoretical framework. When Ss experienced uncertainty resulting from the presentation of evidence which contradicted their existing beliefs, the ensuing curiosity activated epistemic behaviors which consisted of the observation of relevant slides (Examination Time). As a consequence of the observation of the slides, knowledge was acquired which was necessary for the relief of the motivational state of curiosity. This was reflected in the high test scores for Ss in the uncertainty conditions. These findings are similar to the results of a study by Berlyne (1954) in which statements Ss rated as "surprising" (i.e., about which curiosity existed) were better learned than statements which were not so rated.

When curiosity was generated, Ss tended to concentrate their epistemic behaviors on the observation of information which was most likely to reduce it. Since Segment II slides were specifically labeled either "Reward" (congruent information) or "Conflict" (discrepant information), the information they contained may have been considered more instrumental for the reduction of curiosity about the two "theories" of attitude change than the slides which presented the results of the Festinger-Carlsmith experiment (Segment III). The present findings were consistent with this analysis. The effects of uncertainty on Examination Time for Segment III slides were in the same direction as those for Segment II, however, the differences among the conditions were not as reliable.

Results obtained from the self report measure of interest in the slides failed to support Hypothesis I. The differences among treatments were neither in the predicted direction nor significant. The relatively low interest expressed by Ss in the Incongruity Condition may be due as much to weaknesses in the measure as to actual differences in interest. General interest was considered the sum of interest registered on two scales: on one S rated congruent slides and on the other he rated discrepant slides. In conditions where there were strong directional effects (Incongruity and Certainty), the ratings of the scales may not have been independent. Thus, an individual with strong interest in discrepant slides may have expressed it by rating the discrepant slide high in interest and the congruent slide low in interest, yielding a depressed value for the total interest score.

In summary, although there was little difference in their ratings of interest, uncertain Ss examined and acquired more task-relevant information than Certainty Ss. These findings were interpreted as supporting the drive reduction model of epistemic curiosity. Furthermore, curiosity appears to center on information that holds the greatest potential for its reduction as evidenced in the more reliable differences in Examination Time for Segment II slides than for Segment III slides.

Instructional implications. An instructional topic can be made more or less interesting, i.e., curiosity may or may not be aroused. One reason for the relative dearth of curiosity in educational settings (Day, 1968a) may be the heavy reliance on certainty as an instructional practice. Lectures typically are designed to be highly organized, accurate, and complete and to be executed with as much clarity as possible. That is, they are designed to maximize certainty. Like lectures, textbooks are designed to present content clearly and unambiguously (Rothkopf, 1968). Whatever benefits may accrue from the use of these criteria for the development of learning materials and the execution of instruction, highly structured and complete organizations of content are not likely to promote curiosity by leaving the reader with unanswered questions.

One implication of the present findings is that learning is facilitated by the type of uncertainty represented by the Incongruity and Doubt Conditions. Textual and lecture presentations may be more effective when they follow the generation of uncertainty. For example, rather than the common, chronological organization, history textbooks could juxtapose contrasting periods or events or, more simply, present contradictory explanations of the same event.

Often classroom discussion or recitation emphasizes certainty. Drill-type exercises employ teacher questions which evoke and reinforce the learner's dominant response and thus minimize response competition. While such strategies may produce an educational "pay-off," one side-effect of their extensive use may be the reduction of curiosity. On the other hand, open-ended questions which polarize student opinion (doubt) or which place the instructor in the role of the "devil's advocate" (incongruity) may generate response competition. To the extent that curiosity is deemed desirable, the use of uncertainty producing techniques such as open-ended questions, is recommended by the results of the present experiment.

Claims have been made that uncertainty induces the learner to discover, inquire, or think reflectively. Although Suchman (1967) used the terminology of a different theoretical orientation, he appears to characterize uncertainty (the blocking of "assimilation") as the distinguishing feature of discovery techniques and to attach motivational effects to it.

It [discovery] seems to happen only when assimilation is finally achieved after it is first blocked. When the discrepant event is suddenly rendered assimilable through cognitive reorganization there is a release of tension and a feeling of satisfaction (Suchman, 1967, p. 266).

Hunt and Metcalf (1968) argued that skill in reflective thought (the process of testing alternate beliefs or knowledge in light of the grounds that support them) is best acquired by the inclusion of "problematic areas" into the social studies curriculum. Essentially, problematic areas are topics about which great uncertainty exists.

First it [a problematic area] is an area of culture in which values, beliefs, and purported knowledge are frequently and often highly contradictory. Put differently, it is an area of culture ridden with uncertainty--an area fraught with "loose ends." Ideas simply do not jibe or "add up". . . . Our focus is upon inconsistency and the ensuing confusion (Hunt and Metcalf, 1968, p. 293).

Thus, in order to stimulate "reflective thought," the instructional topic must have the capacity to generate uncertainty. Hunt and Metcalf employ this quality as a criterion for the selection of content for instruction which requires the learner to "test" alternatives. Bruner (1966) likens instruction to the process of exploring alternatives. According to Bruner, uncertainty is necessary for the initiation and maintenance of exploration.

The major condition for the activation of exploration of alternatives in a task is the presence of some optimal level of uncertainty. Curiosity, it has been persuasively argued, is a response to uncertainty and ambiguity (Bruner, 1966, p. 43).

In summary, it has been argued that: (a) discovery is motivating because of the satisfaction associated with the reduction of uncertainty (i.e., the sudden assimilation of the discrepant event), (b) uncertainty is a necessary criterion for the selection of topics for reflective thought, and (c) uncertainty is necessary for the activation and maintenance of problem-solving. These claims, which imply motivational effects for inquiry techniques, have not been directly tested in the present research because this experiment was not primarily concerned with discovery, inquiry, or reflective thought. However, the results reported here can be interpreted as evidence that uncertainty activates and maintains the examination and acquisition of knowledge and that the acquisition of knowledge is reinforcing in that it relieves the drive state of curiosity associated with uncertainty.

To the extent that discovery or inquiry techniques also involve uncertainty, as the above arguments claim, they may have similar motivational effects.

### Selective Exposure

According to the findings of the present investigation, selective exposure to discrepant information was affected by the intrinsic utility of the discrepant information (Hypothesis II) but unaffected by the confidence an individual had in his ability to cope with such information (Hypothesis III).

The hypothesis of intrinsic utility. The finding most relevant to the intrinsic utility hypothesis is the behavior of Ss in the Incongruity Condition who registered more interest in articles contradicting their existing beliefs than in articles supporting their beliefs and who examined and acquired more discrepant than congruent information (see Figure 5). In contrast, Ss in the Certainty Condition selected, examined, and acquired more congruent than discrepant information. Thus, the hypothesized interaction between treatments and type of information sought (Hypothesis II) was obtained.

The tendency of Ss in the Incongruity Condition to select and acquire discrepant information is difficult to account for by the theory of cognitive dissonance. Based on dissonance theory, one would have expected the presentation of evidence which contradicted S's existing beliefs (i.e., the Incongruity manipulation) to increase dissonance to moderate proportions and thereby result in the greater selection of congruent information than would occur without a dissonance increasing manipulation (Freedman and Sears, 1965).

According to the rationale for the present research, the findings obtained for the Incongruity Condition constitute an exception to dissonance theory in which Ss were attracted to the discrepant position because they were curious about it. This explanation is supported by the relationship between curiosity and selective exposure which has emerged in the literature as exceptions to predictions based on dissonance theory have been obtained. In his early formulations, Festinger (1957) acknowledged the importance of curiosity as one determinant of the voluntary seeking of new information. However, he considered the motivational effects of curiosity beyond the "central concern" of dissonance theory which primarily focused on those instances in which new information was sought or avoided to maintain the psychological state of consonance. Later, curiosity was depicted as a factor which qualified the tendency of an individual to maintain consonance by avoiding discrepant information: "such avoidance [of discrepant information] would be observed only under conditions where other reasons for exposure, such as usefulness and curiosity, were absent" (Festinger, 1964, p. 96). Rhine (1967) suggested that Festinger may have underplayed the role of curiosity in the process of selective exposure. He argued that curiosity may be a "primary determinant of many of the findings on selectivity" (Rhine, 1967, p. 25). Rather than extend or develop dissonance theory to account for inconclusive or negative findings, there is a trend to evoke curiosity as an explanation of the violations of dissonance theory that have been obtained.

The present analysis relies on a drive reduction model of epistemic curiosity to explain the seeking of discrepant information

in the Incongruity Condition. Initially, the experimental topic of attitude change produced little response competition. Most Ss had the same dominant belief (the "Law of Reward") associated with the topic. By exposing Ss in the Incongruity and Doubt Conditions to evidence alleged to support a new or subordinate belief (the "Theory of Conflict") the subordinate belief was strengthened, and as a consequence, response competition was sharpened. The importance of response competition (subjective uncertainty) in the present formulation is that it is assumed to result in epistemic curiosity, a state of arousal or drive which appears to direct observational responses toward the subordinate belief. The high D/E Ratios of Ss in the Incongruity Condition are an example of observational responses of this type. Finally, the greater acquisition of knowledge of the discrepant position by Ss in the Incongruity Condition was necessary to reduce the curiosity drive aroused by the generation of response competition.

The hypothesis of intrinsic utility is a deduction from the drive reduction model described above. The hypothesis holds that when information is useful for the reduction of response competition and the ensuing epistemic curiosity, it will be sought even at the risk of increasing dissonance. The information-seeking behavior of the Incongruity Ss suggests that discrepant information becomes useful when a subordinate belief is strengthened and that discrepant information is sought and acquired under these circumstances. The attraction of Incongruity Ss to "dissonance increasing" information also suggests that the construct of intrinsic utility may help explain findings which have not been accounted for within the theory of

cognitive dissonance; namely, instances in which discrepant information was not avoided or it was sought.

Post hoc analyses based on the intrinsic utility hypothesis.

It was suggested above that the intrinsic utility hypothesis permits explanations of findings which are difficult to account for within the framework of dissonance theory. In one study within this area (Sears, 1965), the Ss read heavily biased case reports of a criminal trial which favored either the defense or prosecution positions and then were asked to choose between reading either the defense or prosecution summation. The results indicated that Ss preferred information which was opposite to both the biased "factual" report they had read and to their own opinions. These findings can be interpreted within the construct of intrinsic utility. To present only one heavily biased position when S knows there is another side, as in the case of a mock trial, is to render discrepant information regarding the other side intrinsically useful. That is, the mock trial experimental situation generated response competition (defense vs. prosecution) which required discrepant information for its reduction. Under these circumstances, discrepant information was useful for the reduction of uncertainty and was therefore sought. Similar interpretations can be made of other mock trial studies in which discrepant information was preferred or in which preference for congruent information was not found (Sears, 1966; Sears and Freedman, 1965).

The experimental situations of other studies of selective exposure may have generated response competition and thereby modified the tendency to select congruent information. Uncertainty produced

by the use of the controversial issue of wire tapping (greater number of alternatives) and S's knowledge that the group of which he was a part was evenly divided on the issue (equiprobability of response) may account, in part, for the preference Brodbeck (1956) found for non-supportive information. In another study (Adams, 1961), the uncertainty associated with the "High Dissonance" Condition which consisted of a message which contradicted S's existing beliefs may account for the slight preference for discrepant information. In a final example, Freedman (1965b) presented Ss with a one-sided evaluation of a student alleged to be a candidate for an "international conference." The Ss were instructed to choose between two additional statements about the candidate made by persons who "knew him well." One statement supported the biased evaluation and S's opinion; the other did not. According to the present interpretation, the emphatic selection of discrepant information (17 of the 18 Ss) may be attributed, in some degree, to the uncertainty generated by S's knowledge that one of the two persons alleged to know the candidate well disagreed with the biased evaluation S had received. Thus discrepant information was necessary for the reduction of the "competition" between the two evaluations.

According to the above post hoc interpretations, discrepant information may be necessary to reduce response competition produced by uncertain experimental situations. Therein lies its intrinsic utility. To the extent that the present analyses are valid, they indicate that intrinsic utility is a factor to be controlled in selective exposure experiments as well as a variable to be investigated in its own right.

Confidence. Festinger (1964) suggested that in selective exposure experiments, highly confident individuals may seek discrepant information in order to refute it and thereby reduce the dissonance created by their knowledge that the discrepant information exists. However, the expectation that high confidence Ss seek discrepant information more than those who experienced low confidence was not met by the findings of this experiment. On all measures of selective exposure, including those not used in previous studies of confidence (Discrepant Slide Choice and D/E Ratio), no differences in selective exposure between the experimentally induced High and Low Confidence groups were obtained. The fact that High and Low Confidence Ss did not differ in their preference for discrepant information cannot be attributed to a failure in the manipulation of confidence. Differences in confidence were manifest in measures taken both before and after Ss examined the experimental materials, indicating that the confidence manipulation was in effect while Ss were choosing between congruent and discrepant slides.

The present findings regarding the effects of confidence on selective exposure contrast with the results obtained by Canon (1964) and are consistent with results of studies by Freedman (1965a) and Mills and Ross (1964). Conditions of uncertainty were employed and choice and latency measures used in the present study in the hope of detecting the effects of confidence on selective exposure. Unfortunately, the results add to rather than reduce the dilemma plaintively described by Freedman as follows:

It is not at all clear why the two studies [Canon, 1964; Freedman, 1965a] produced such striking results in regard

to the effect of confidence, but it is equally uncertain which results will replicate in the future. The analysis in terms of confidence offered by Festinger is very logical and appealing and it would be very nice if it turned out to be correct. At the moment, however, the findings are contradictory and it remains for someone else to attempt another replication and perhaps resolve the discrepancy (Freedman, 1965a, p. 780).

Instructional implications. At times materials used for student study and research include information that agrees and information that disagrees with the learner's existing beliefs. Under these conditions, what an individual learns may depend on the certainty with which he approaches the instructional task. The present findings suggest that when the learner experiences certainty, he acquires different knowledge from the examination of the same information than he would under conditions of uncertainty. Incongruity and certainty, in particular, appear to have opposite effects on the direction of information-seeking.

For most learners, the state of uncertainty results from the instructor's manipulation of the instructional setting. Accordingly, unless the instructor takes the "uncertainty potential" of his materials and strategies into consideration, the learner may be directed consistently toward information which agrees with his existing beliefs. A failure to consider the effects of uncertainty in the development of instructional programs limits the effectiveness of learning activities such as the study of controversial issues and research assignments.

The instructor can utilize uncertainty according to the dictates of his instructional objectives. For example, an objective may require that the learner examine and acquire information which conflicts

with a belief he already holds (e.g., an examination of the economic basis for the Civil War when the learner is convinced that the moral issue of slavery was the cause). According to the present results, incongruity will direct the learner toward information which conflicts with his existing beliefs. Sometimes instructional objectives require the "open" exploration of conflicting alternatives. The present results suggest that the learner will maintain relatively high levels of interest in both congruent and discrepant alternatives and explore both alternatives before selecting one to examine more extensively when instructional strategies are more analogous to the Doubt Treatment. In addition to the exploration of alternatives, instructional objectives may require the synthesis of information derived from several alternatives to form a "new" generalization. The success of synthesis appears to rest, in part, upon the acquisition of components which are later combined to constitute a new pattern or structure (Bloom, et al., 1956). Since Ss in the Doubt Condition acquired relatively large amounts of both congruent and discrepant information, it can be assumed that the learner in similar instructional settings will acquire the components which are prerequisites for synthesis and thereby facilitate that process.

In summary, the implications of the intrinsic utility hypothesis for instructional settings are twofold: a) by ignoring the "uncertainty potential" of instructional materials and strategies, the instructor permits students to "drift" into study patterns in which information is selectively examined on the basis of its congruence with existing beliefs, and (b) the instructor can manipulate response

competition and thereby direct information-seeking according to the demands of his objectives which may include the acquisition of discrepant information, the exploration of alternatives, or the synthesis of information provided by various alternatives to form new generalizations.

#### Individual Differences and Selective Exposure

Two analyses of the effects of individual differences on information-seeking were conducted. In one, the relationship between dogmatism and various levels of experimentally induced confidence was examined. It was reasoned that an interaction between dogmatism and the confidence manipulations may, in part, account for inconsistent findings for the main effects of confidence on selective exposure. Furthermore, the effect of several personality traits on information-seeking under conditions of doubt was examined.

Interaction between dogmatism and confidence. One dimension along which open- and closed-minded persons appear to differ is their reaction to authority (Rokeach, 1960). Therefore, it was assumed that open- and closed-minded persons would be differentially affected by the confidence manipulation which consisted of an authority endorsement (High Confidence) or contradiction (Low Confidence) of the S's existing beliefs. Specifically, open-minded persons were expected to seek discrepant information when in either the High or Low Confidence Conditions while closed-minded persons were expected to seek congruent information when in the High Confidence Condition and discrepant information when in the Low Confidence Condition. The regression lines

which resulted indicated that the effect of dogmatism on confidence was in the predicted direction for measures of DSC, D/E Ratio, and discrepant items correct (see figures 6 and 7), however, the interactions which were obtained did not approach significance.

The behavior of high and low dogmatics within the framework of the present experiment contrasts with the findings of a recent study of the problem-solving behavior of open- and closed-minded persons (Schultz and Di Vesta, 1970). In that experiment, Ss were given advice from presumed experts that endorsed either the S's existing beliefs that were inappropriate for the problem situation (Endorsement of Old Beliefs) or beliefs that were necessary for the solution, but not initially held by S (Endorsement of New Beliefs). The results indicated that new belief advice facilitated problem-solving for high dogmatics and inhibited problem-solving for low dogmatics. Endorsement of old beliefs had the opposite effect; namely, it was facilitative for low dogmatics but inhibitive for high dogmatics.

The failure to obtain interactions of significant proportions in the present experiment was due, in part, to the behavior of closed-minded Ss. This group did not seek as much discrepant information as expected when their existing beliefs were contradicted (i.e., in the Low Confidence Condition). In this regard, it is of interest that the closed-minded Ss in the problem-solving experiment accepted expert advice which contradicted their existing beliefs (i.e., in the New Belief Endorsement Condition) and applied the discrepant information to the solution of the problem. Because of the receptivity of closed-minded Ss to discrepant information in the comparable problem-solving

study, the relatively weak tendency of closed-minded Ss in the present study to seek discrepant information may be due more to methodological difficulties than to the inadequacy of the rationale.

For example, one methodological problem may have been that the E's authority "image" was not as pronounced in the present study as it was in the problem-solving experiment. The expectation that closed-minded Ss in the Low Confidence Condition would seek discrepant information was based on their tendency to "blindly" accept authority advice. Accordingly, reduction in the authority effect of E would occasion a corresponding reduction in the amount of discrepant information sought. This interpretation cannot be tested within the framework of the present experiment, and requires a replication with the manipulation of authority as an independent variable.

Individual differences in selective exposure. Hypothesis V predicted that individuals who were open-minded, tolerant of ambiguity, or subjectively uncertain seek and acquire more discrepant information in the Doubt Condition than persons with the opposite tendencies. These expectations were based on the following assumptions: (a) Since the discrepant position represents a "new belief" system which is threatening to the closed-minded but not to the open-minded persons (Rokeach, 1960), closed-minded persons seek and acquire less discrepant information than those who are open-minded, (b) Persons intolerant of ambiguity are less likely than tolerant persons to maintain the ambiguous condition of examining a counter-argument which explains a phenomenon already accounted for by an existing belief, and finally, (c) In contrast to individuals who are "quick" to generate response competition,

those who are "slow" to experience response competition are less likely to feel that discrepant information holds intrinsic utility precisely because the utility is that of reducing response competition.

An inverse relationship was obtained between intolerance of ambiguity and the acquisition of discrepant information and a positive relationship was obtained between subjective uncertainty and the acquisition of discrepant information. Other measures of selective exposure were unrelated to subjective uncertainty and intolerance of ambiguity. Dogmatism was found to have no relationship to any of the measures of selective exposure.

It is difficult to interpret the fact that open- and closed-minded persons did not differ in their preference for discrepant information as evidence that the Dogmatism Scale lacks validity. In addition to a series of validating experiments by Rokeach (1960), there is further evidence (Ehrlich and Lee, 1967; Vacchiano, Strauss, and Hochman, 1969) that high and low dogmatics differ in their approach to novelty, cognitive inconsistency, and in their facility for learning new beliefs.

Two possibilities may account for the fact that no relationship was established in the present experiment between dogmatism and selective exposure. The first is that the effect of individual differences on selective exposure may be more complex than a unidimensional relationship (Abelson, 1968). A study by Smith (1968) suggests that a multidimensional examination of the effect of dogmatism on selective exposure may be a fruitful one. Smith found that high dogmatics believed and retained more facts that contradicted their attitude

(discrepant information) than low dogmatics. On the other hand, low dogmatics believed and retained more supportive facts. Only when blocked on interest in the topic did the predicted relationship between dogmatism and knowledge of the discrepant position occur; namely, when their interest was low, open-minded Ss demonstrated greater acquisition of discrepant information than closed-minded Ss.

Perhaps the construct of dogmatism, whose components include cognitive compartmentalization, dichotomization of beliefs, and authority orientation is too general to accurately predict differences in behavior on the specific task of seeking discrepant information (Feather, 1964; Glass, 1968). In this regard, Glass proposed, "a search for personality variables that are coordinate with the type of inconsistency being studied" (Glass, 1968, p. 623). Recently, Ausubel and Tenzer (1970) constructed a Dogmatism Scale containing items related specifically to attributes of dogmatism which influence the selection or rejection of discrepant information. The investigators also administered a test of the S's "attitudinal bias" on the particular issue employed in the experimental materials. A negative relationship was obtained between the dogmatism scale and the acquisition of knowledge of the discrepant position.

In the present experiment, the Uncertainty Scale was designed as a task-specific personality measure which was coordinate with the requirements of the experimental task. That is, the Uncertainty Scale was designed to measure the tendency of an individual to generate response competition and it contained items which were analogous to the conditions of the Doubt Treatment in which it was used. Since the

components of the Scale of Intolerance of Ambiguity (Budner, 1962) include complexity, novelty, and insolubility, that scale was also assumed to reflect an individual's predisposition to generate response competition.

The finding that both the predispositions to be uncertain and to be tolerant of ambiguity were positively related to the acquisition of discrepant information can be explained within the framework of the drive reduction model of curiosity described above. The uncertain Ss presumably generated large amounts of response competition when exposed to evidence which supported a new or subordinate belief (i.e., the Doubt manipulation). Accordingly, they acquired more discrepant information than those who were less uncertain because the discrepant information was useful for the reduction of the response competition they experienced.

Several implications can be drawn from the relationship obtained between the personality variables of subjective uncertainty and intolerance of ambiguity and the acquisition of discrepant information. An important feature of the findings is that evidence was obtained which indicated that individual differences in uncertainty selectively affect what an individual learns from a given communication, particularly one which contains conflicting alternatives. Just as potent experimental manipulations, such as the Incongruity Condition, direct Ss toward discrepant information, the predisposition to be uncertain which Ss bring to the experimental task has a similar effect.

In addition, validating evidence for the Uncertainty Scale was obtained from the relationship found between subjective uncertainty and the acquisition of discrepant information. Validation was further established by the significant but modest relationship between subjective uncertainty and intolerance of ambiguity ( $r = .31$ ,  $p < .005$ ). Finally, the results obtained for the Uncertainty Scale and the Scale of Intolerance of Ambiguity support the proposal by Feather (1964) and Glass (1968) for the use of personality measures which are coordinate with the type of cognitive inconsistency being studied.

The above implications, however, must be qualified by the fact that the Uncertainty Scale and Intolerance of Ambiguity Scale along with the Dogmatism Scale did not correlate with other measures of selective exposure (e.g., the D/E Ratio or interest in discrepant slides). This discrepancy suggests further investigation of the relationships among measures of selective exposure--self reports of interest, examination time, and the acquisition of knowledge.

Instructional implications. Curriculum theorists frequently emphasized the need to "teach for individual differences." (Moffatt, 1963; Smith, Stanley, and Shores, 1957; Taba, 1962; Wesley and Wronski, 1964) Traditionally, schools have employed remediation and alteration of instruction as instructional procedures to minimize the effects of individual differences in learning (Cronbach, 1967). The former tactic was characterized as a "holepatching" procedure which erases individual differences so teaching can maintain the same unaltered course. Remediation is manifest in the branching techniques of programmed instruction and compensatory education programs. Alteration of instruction, which is characterized by aptitude-treatment interactions (ATI),

implies varying instructional programs in order to maximize learning for individuals who differ along a personality or cognitive dimension. Instruction based in the ATI approach, for example, would employ verbal presentations for those high in verbal ability and visual presentations for those high in imagery.

Since an interaction between treatments and aptitude was not obtained in the present experiment, alteration of instruction cannot be implied from these results. In lieu of obtaining an ATI and in view of the difficulties and cost of developing alteration programs, remediation may be of more educational and psychological interest than Cronbach implies (Carroll, 1967). The significant negative correlation between subjective uncertainty and acquisition of knowledge obtained in the present experiment, suggests a remediation program in which learners who are subjectively certain are trained to be uncertain.

Sieber (1969) developed a remedial program to generate uncertainty in students who "know it all," in "true believers" who reject non-supportive information, and in others who unquestioningly accept what they read or hear. The program consists of the following: (a) presenting learners with problematic situations and explicitly directing them to generate alternate hypotheses, to estimate the amount of uncertainty they associate with each hypothesis, and to search for relevant information to support the hypotheses, and (b) rewarding the reasonableness of the learner's uncertainty estimates and their discrimination of problem cues which lead to opposing solution alternatives rather than rewarding the attainment of correct answers. The advantages of an uncertainty training procedure of this type proposed

by Sieber is that through remediation, learners who tend to be certain would then be able to benefit from instruction involving problematic conditions such as discovery and inquiry.

The difficulties encountered in establishing a direct relationship between dogmatism and selective exposure caution against the unqualified use of dogmatism to differentiate instruction which requires the learner to examine alternatives (e.g., in the study of controversial issues). Since most instructional tasks are more difficult to define than experimental tasks, the appropriateness of dogmatism as a predictor of learner behavior across a variety of classroom activities may be difficult to ascertain. In addition, the instructional setting is one in which other variables may operate to modify the effects of dogmatism (e.g., interest in the instructional topic). Given the incomplete information about the effects of dogmatism on selective exposure, individualized instructional prescriptions may "overdifferentiate" and thereby inflict more harm than ignoring individual differences. In this regard, Cronbach suggested that, "the poorer the differential information, the less the teacher should depart from the average" (Cronbach, 1967, p. 30).

#### Summary

The results of the present experiment were explained by reference to the drive reduction model of epistemic curiosity developed by Ferlyne (1960, 1963, 1965b). This model was employed to account for the finding that uncertain Ss examined and acquired more general knowledge of the experimental topic and of a position discrepant from

their own than certain ss. Epistemic curiosity was conceived of as:

- (a)resulting from the strengthening of new or subordinate beliefs,
- (b)being directed toward information which had the greatest potential for its reduction, (c)accounting for the finding of interest in discrepant information not explained by dissonance theory, and (d)a pre-disposition which varied among individuals who differed in the amount of response competition they tended to develop and which resulted in differential acquisition of information.

The applications of the findings to instructional settings included suggestions that strategies and materials which rely on certainty be supplemented with those which employ doubt, incongruity, contrast, and conflict. It was also suggested that by taking the uncertainty potential of instructional materials into account, the instructor can prevent undue attention to congruent information and can direct information-seeking in a way that is consistent with his objectives. The motivational claims of the "new" curriculums which are based on discovery-type strategies received indirect support. Finally, since failure to generate response competition appears to inhibit learning, remediation procedures were suggested for learners who tend to be subjectively certain.

## CHAPTER VII

### SUMMARY

For the purpose of this experiment, instruction was conceived of as a process by which instructional inputs (e.g., teaching style and strategy and instructional materials) are modified and processed by the learner to yield instructional outputs (e.g., acquisition of knowledge or skills). According to this formulation, variables which have been found to influence learning and which are manifest in the classroom are of concern to the investigator of instruction. The advantages of this approach are that "realistic" variables can be selected for examination in the relatively controlled conditions of the laboratory and that the theory and findings of investigators of learning can be utilized.

This study investigated the conditions that induce individuals to seek and acquire information (epistemic curiosity). The initiation of epistemic curiosity has been attributed, in large part, to the amount of uncertainty produced by stimuli which elicit competing response alternatives (Berlyne, 1962). Uncertainty and the consequent epistemic curiosity was assumed to be heightened when the number of competing responses is increased or when the responses are of equal or close-to-equal strength. Moreover, the drive-like state of curiosity is reduced by the acquisition of knowledge which reduces response competition. Because of the drive qualities ascribed to curiosity,

information acquired in association with its reduction is assumed to be better learned than information that does not reduce curiosity. Thus, curiosity has been conceived of as a motivational state which results from external stimulus conditions (instructional inputs) and which affects the amount and nature of what is learned (instructional outputs).

This study also explored the conditions that induce individuals to seek and acquire discrepant information, that is, information inconsistent with beliefs they already hold. According to Festinger's (1957) initial notions of cognitive dissonance, knowledge that information is inconsistent with existing beliefs comprises a set of conflicting cognitions. The resulting dissonant state is psychologically disturbing for the organism, motivating it to employ such dissonance reducing activities as selective exposure, i.e., seeking information congruent with one's position thereby reducing dissonance and avoiding discrepant information that would tend to increase dissonance. In order to explain instances in which individuals have sought or at least failed to avoid discrepant information, Festinger (1964) modified his earlier formulations by suggesting that individuals may be receptive to discrepant information when it is useful and when they are sufficiently confident of their ability to refute the counter-arguments posed by the discrepant information.

Discrepant information may be sought for its intrinsic utility. This condition occurs when an existing belief is suddenly found to compete with another that appears valid. As a result, the two alternatives may have close-to-equal strengths. Under these circumstances an individual may actually seek information regarding the

discrepant alternative to reduce the equality of the competing responses.

The rationale on which this study was based suggests that various levels of uncertainty affect the intrinsic utility of congruent and discrepant information and thereby differentially direct information-seeking behaviors: (a) when the S's opinion or knowledge is confirmed by evidence from an expert (certainty) discrepant information holds no utility and is therefore avoided according to the tenets of selective exposure, (b) when S is presented with presumably reliable evidence (or expert's view) that contradicts his knowledge or belief (incongruity), discrepant information is useful, if not necessary, for the reduction of uncertainty, (c) when S is presented with experts who are undecided or with evidence which is contradictory (doubt), the congruent information is of some use, but the discrepant information is again necessary for the resolution of the uncertain situation. In summary, incongruity and doubt direct information-seeking toward discrepant information; certainty directs it toward congruent information.

In a typical selective exposure experiment, S may select discrepant information if he is confident he can counter arguments posed by the discrepant material. This proposition was tested in several experiments in which confidence was experimentally induced by informing Ss that they did well (high confidence) or did poorly (low confidence) on a "test" administered by E. Since confidence typically has been induced by informing Ss that their responses have or have not met the standards set by an expert, an authority, or by E, it

was reasoned that the effectiveness of the confidence manipulation would be modified by the individual predisposition to accept feedback attributed to an authority. Accordingly, dogmatic persons were expected to seek congruent information in the high confidence condition because their existing beliefs were reinforced by an authority while they were expected to seek discrepant information in the low confidence condition because an authority advocated a discrepant belief.

Other individual differences may affect the direction of information-seeking. Discrepant information would hold less utility for individuals who fail to generate response competition or who avoid ambiguous situations than for those who are "quick" to generate response competition or who are attracted to ambiguous situations. Therefore, an individual's tendency to be subjectively certain or intolerant of ambiguity affects the amount of discrepant information he seeks.

Based on this rationale, it was hypothesized that uncertainty is directly related to the examination and acquisition of knowledge about the general experimental topic and of the position which is discrepant with the one the individual holds. It was also expected that experimentally induced confidence and personality traits such as subjective certainty, intolerance of ambiguity, and dogmatism are inversely related to the seeking and acquisition of discrepant information. A final hypothesis was that confidence is inversely related to the seeking and acquisition of discrepant information for closed-minded persons and unrelated for open-minded persons.

Two experiments were conducted to test these hypotheses. The first investigated the effects of uncertainty (Experiment I) on

information-seeking; the second examined both the effects of confidence on, and the relationship of personality differences to, information-seeking at one level of uncertainty (Experiment II).

Tests designed to measure dogmatism, intolerance of ambiguity, and an Uncertainty Scale specifically developed for this experiment were administered to students in education courses, all of whom were potential Ss for the study, several weeks before the experiments were conducted.

In both experiments Ss were told that the experimenters were preparing instructional materials on the topic of attitude change. It was explained that the S's task was to examine a pair of slides containing information on attitude change and to select what he considered the more interesting member of the pair. In actuality, the slides conveyed statements about the Festinger-Carlsmith (1959) investigation of the cognitive effects of forced compliance. The use of the Festinger-Carlsmith research as subject matter for experiments within the present framework had at least two advantages: different predictions can be made based on the two conflicting theoretical positions (dissonance vs. reinforcement) and, prior to the experiment, the reinforcement position is invariably invoked by those who examined the experimental problem. The Ss were presented an experimental problem dealing with attitude change and instructed to endorse one of the two positions during the initial phase of the experiment. Thus, information regarding reinforcement was considered congruent with Ss' beliefs and information regarding dissonance was considered discrepant with their beliefs.

In Experiment I and Experiment II, there were 14 slide-pairs, in which the two members were identical descriptions of the general procedures and results of the Festinger-Carlsmith research. In the 16 remaining pairs, a congruent slide (reinforcement information) was projected simultaneously with a discrepant slide (dissonance information) by use of two carousel projectors. These critical pairs of slides were balanced in form, length, and content. The S was instructed to turn off the less interesting slide and concentrate on the more interesting slide. Thus it was possible to determine the number of congruent and discrepant selections made by each S, the time spent examining the two slides before identifying the less interesting one (Reaction Time), and the time spent on further study of the more interesting one (Examination Time).

Additional dependent measures included a multiple choice test of the congruent and discrepant information and of the results of the Festinger-Carlsmith experiment. In addition, several self report interest scales were administered. Data concerning the S's actual selection of the congruent or discrepant information presented on slides were collected on a Gerbrands event recorder.

The treatments in Experiment I consisted of the manipulation of three levels of uncertainty: Incongruity, Doubt, and Certainty. In the Incongruity Condition, Ss were shown evidence supporting dissonance theory that contradicted their position. The Doubt Condition consisted of presenting Ss with both supporting and contradictory evidence. In the Certainty Condition, Ss were only shown evidence that supported reinforcement theory that agreed with their position.

Finally, no evidence was presented to Ss in the Control Condition. These treatments imply a completely randomized design with three experimental groups (Incongruity, Doubt, and Certainty) and one control.

All Ss in Experiment II received the Doubt instructions administered in Experiment I. In addition, Ss in two of the groups were administered a test that was purported to measure "intuitive understanding of attitude change." The Ss in one of these groups were told that their responses placed them in the 93rd percentile, thereby inducing the condition of High Confidence. The Ss in the other group were told that their scores placed them in the 11th percentile, thereby inducing the condition of Low Confidence. The Doubt Condition employed in Experiment I served as the control for Experiment II.

These treatments imply a completely randomized design with two experimental groups (High and Low Confidence) and a control. In order to assess the relationship between confidence and dogmatism, a regression analysis was made in which dogmatism was considered the independent variable and measures of discrepant information the dependent variables for each of the treatment groups. Finally, dogmatism, intolerance of ambiguity, and subjective uncertainty were correlated with measures of selective exposure for Ss in the Doubt Condition.

The drive reduction model of epistemic curiosity was successful in accounting for the information-seeking behavior of Ss in the uncertainty conditions. Those Ss who had been exposed to evidence which contradicted their beliefs (i.e., the Incongruity and Certainty manipulations) examined and acquired more information on the experimental topic than Ss who had been exposed to evidence which agreed

with their existing beliefs. Presumably, the effect of the discrepant evidence was to strengthen new or subordinate beliefs, thereby sharpening response competition with the consequent arousal of epistemic curiosity. As a result, Ss engaged in epistemic behaviors (observation) which resulted in the acquisition of new information.

The analyses of data obtained on measures of interest and the examination and acquisition of congruent and discrepant information yielded an interaction between levels of uncertainty and type of information sought. Certainty Ss preferred, sought, and acquired congruent information while Incongruity Ss preferred, sought, and acquired discrepant information. The information-seeking behavior of Ss in the Certainty Condition was consistent with expectations based on dissonance theory; namely, information which could increase dissonance was avoided. However, it is difficult to account for the seeking of information which could increase dissonance by Ss in the Incongruity Condition within the context of dissonance theory. The dissonance increasing behaviors can be explained by the hypothesis of intrinsic utility. According to this notion, the examination and acquisition of information related to the new or subordinate belief (the "Theory of Conflict") suggests that information about that belief was useful for the reduction of response competition and is therefore the focus of epistemic behaviors.

Confidence appears to be unrelated to any of the measures of selective exposure including the DSC and the D/E Ratio, although the confidence manipulation was successfully induced. Analysis of the relationship between dogmatism and confidence revealed a tendency

for dogmatic persons to seek and acquire more discrepant information under conditions of Low Confidence (when authorities endorsed discrepant beliefs) than under High Confidence (when authorities endorsed their existing beliefs). These tendencies, however, were not reliable. One reason for the lack of reliability may have been the relatively weak "authority image" projected by E. As a consequence, dogmatic Ss may not have been as influenced by the authority's alleged belief as they otherwise would have been and therefore they did not seek information about the beliefs advocated by the authority.

Dogmatism did not correlate with any of the measures of selective exposure. The failure to obtain the hypothesized inverse relationship between dogmatism and preference for discrepant information may have been due, in part, to the global nature of the dogmatism construct. That is, dogmatism may include components which do not entirely relate to the requirements of the experimental task (e.g., authority-orientation, compartmentalization and dichotomization of beliefs). Therefore, the correlation between it and selective exposure was low. In this regard, two task-specific personality differences were found to be reliably related to the acquisition of discrepant information in such a way that the predispositions to be uncertain and tolerant of ambiguity facilitated learning and the tendency to be certain or intolerant of ambiguity inhibited learning.

In its present state, much of instructional practice relies on procedures which are based on certainty rather than uncertainty. These include lectures and texts which tend to be highly organized and complete as well as drill-type procedures in which the learner's

dominant response is elicited and reinforced. One implication of the present findings is that student learning will be facilitated when it follows the generation of uncertainty. Accordingly, in constructing instructional materials and strategies, the use of open-ended questions containing conflicting interpretations, and phenomena which violate the learner's expectations are recommended. These techniques have been included in curriculum projects designed to stimulate student discovery, inquiry, or reflective thought, which have utilized uncertainty as a criterion for the selection of instructional topics and as a motivational device sequenced throughout instruction to maintain the learner's explorations.

A second implication of the findings is that uncertainty can be employed to direct the learner's search for new information away from his existing beliefs and thus broaden the scope of his learning. In this regard, incongruity appears to be appropriate as a strategy for implementing instructional objectives which require the learner to focus on information associated with beliefs which contradict those he currently holds. The use of doubt is suggested by the findings to implement objectives which require the learner to "openly" explore conflicting alternatives or to synthesize information gleaned from various alternatives to form a new generalization.

Finally, Ss who were tolerant of ambiguity and subjectively uncertain acquired more discrepant information than those who were intolerant of ambiguity and subjectively certain. This finding suggests remediation procedures for those who tend to be certain of their

responses in problematic situations. These procedures include directing the learners to generate alternate hypotheses and reinforcing the reasonableness of the various alternatives rather than the correctness of a single answer.

## REFERENCES

- Abelson, R. P. Comment: Uncooperative personality variables. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, and P. H. Tannenbaum (Eds.), Theories of cognitive consistency: A sourcebook. Chicago: Rand McNally, 1968.
- Adams, H. E. and Vidulich, R. N. Dogmatism and belief congruence in paired-associate learning. Psychological Reports, 1962, 10, 91-94.
- Adams, J. S. Reduction of cognitive dissonance by seeking consonant information. Journal of Abnormal and Social Psychology, 1961, 62, 74-78.
- Alpert, F. and Haber, R. N. Anxiety in academic achievement situations. Journal of Abnormal and Social Psychology, 1960, 61, 207-215.
- Ashner, M. J. The language of teaching. In B. O. Smith and R. H. Ennis (Eds.), Language and concepts in education--Analytic study of educational ideas. Chicago: Rand McNally, 1961.
- Ausubel, D. P. A cognitive-structure theory of school learning. In L. Siegel (Ed.), Instruction--Some contemporary viewpoints. San Francisco: Chandler, 1967.
- Ausubel, D. P. and Tenzer, A. G. Components of and neutralizing factors in the effects of closed-mindedness on the learning of controversial material. American Educational Research Journal, 1970, 7, 267-273.
- Berlyne, D. E. An experimental study of human curiosity. British Journal of Psychology, 1954, 45, 256-265.
- Berlyne, D. E. Conflict and information-theory variables as determinants of human perceptual curiosity. Journal of Experimental Psychology, 1957, 53, 399-404.
- Berlyne, D. E. The influence of complexity and novelty in visual figures on orientating responses. Journal of Experimental Psychology, 1958, 55, 289-296. (a)
- Berlyne, D. E. Supplementary report: Complexity and orienting responses with longer exposures. Journal of Experimental Psychology, 1958, 56, 183. (b)

- Berlyne, D. E. Conflict, arousal, and curiosity. New York: McGraw-Hill, 1960.
- Berlyne, D. E. Conflict and the orientation reaction. Journal of Experimental Psychology, 1961, 62, 476-483.
- Berlyne, D. E. Uncertainty and epistemic curiosity. British Journal of Psychology, 1962, 53, 27-34.
- Berlyne, D. E. Complexity and incongruity variables as determinants of exploratory choice and evaluative ratings. Canadian Journal of Psychology, 1963, 17, 274-290. (a)
- Berlyne, D. E. Motivational problems raised by exploratory and epistemic behavior. In S. Koch (Ed.), Psychology--A study of a science. Vol. 5. New York: McGraw-Hill, 1963. (b)
- Berlyne, D. E. Curiosity and education. In J. D. Krumboltz (Ed.), Learning and the educational process. Chicago: Rand McNally, 1965. (a)
- Berlyne, D. E. Structure and direction in thinking. New York: Wiley, 1965. (b)
- Berlyne, D. E., Craw, M. A., Salopotek, F. H., and Lewis, J. L. Novelty, complexity, incongruity, intrinsic motivation, and the GSR. Journal of Experimental Psychology, 1963, 66, 560-567.
- Berlyne, D. E. and Lawrence, G. H. Effects of complexity and incongruity variables on GSR, exploratory behaviors, and verbally expressed preferences. Journal of General Psychology, 1964, 71, 21-45.
- Berlyne, D. E. and McDonnell, P. Effects of stimulus complexity and incongruity on the duration of EEG desynchronization. Electroencephalography and Clinical Neurophysiology, 1965, 18, 156-161.
- Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., and Krathwohl, D. R. (Eds.), Taxonomy of educational objectives: The classification of educational goals: Handbook I: Cognitive domain. New York: David McKay, 1956.
- Brehm, J. W. and Cohen, A. R. Explorations in cognitive dissonance. New York: Wiley, 1962.
- Brim, O. G. and Hoff, D. B. Individual and situational differences in desire for certainty. Journal of Abnormal and Social Psychology, 1957, 54, 225-233.
- Brock, T. C. Commitment to exposure as a determinant of information receptivity. Journal of Personality and Social Psychology, 1965, 2, 10-19.

- Brock, T. E. and Balloun, J. L. Behavioral receptivity to dissonant information. Journal of Personality and Social Psychology, 1967, 6, 413-428.
- Brodbeck, M. The role of small groups in mediating the effects of propaganda. Journal of Abnormal and Social Psychology, 1956, 52, 166-170.
- Brown, J. S. The motivation of behavior. New York: McGraw-Hill, 1961.
- Bruner, J. S. Toward a theory of instruction. New York: W. W. Norton, 1966.
- Budner, S. Intolerance of ambiguity as a personality variable. Journal of Personality, 1962, 30, 29-50.
- Canon, L. K. Self-confidence and selective exposure to information. In L. Festinger (Ed.), Conflict, decision, and dissonance. London: Tavistock, 1964.
- Cantor, G. N., Cantor, J. H., and Detrichs, R. Observing behavior in pre-school children as a function of stimulus complexity. Child Development, 1963, 34, 683-689.
- Carroll, J. B. Words, meanings, and concepts: Part II. Concept teaching and learning. Harvard Educational Review, 1964, 34, 191-202.
- Carroll, J. B. School learning over the long haul. In J. D. Krumboltz (Ed.), Learning and the educational process. Chicago: Rand McNally, 1965.
- Carroll, J. B. Instructional methods and individual differences: Discussion of Dr. Cronbach's paper. In R. M. Cagne (Ed.), Learning and individual differences. Columbus: Charles E. Merrill, 1967.
- Chapanis, N. P. and Chapanis, A. Cognitive dissonance: Five years later. Psychological Bulletin, 1964, 61, 1-22.
- Clark, P. and James, J. The effects of situation, attitude intensity, and personality on information-seeking. Sociometry, 1967, 30, 235-245.
- Cohen, A. R., Brehm, J. W., and Latane, B. Choice of strategy and voluntary exposure to information under public and private conditions. Journal of Personality, 1959, 27, 63-73.
- Cronbach, L. J. The logic of experiments on discovery. In L. S. Shulman and E. R. Keislar (Eds.), Learning by discovery: A critical appraisal. Chicago: Rand McNally, 1966.

- Cronbach, L. J. How can instruction be adapted to individual differences? In R. M. Gagne (Ed.), Learning and individual differences. Columbus: Charles E. Merrill, 1967.
- Day, H. I. Evaluations of subjective complexity, pleasingness, and interestingness for a series of random polygons varying in complexity. Perception and Psychophysics, 1967, 2, 281-286.
- Day, H. I. Role of specific curiosity in school achievement. Journal of Educational Psychology, 1968, 59, 37-43. (a)
- Day, H. I. Some determinants of looking time under different instructional sets. Perception and Psychophysics, 1968, 4, 279-281. (b)
- Dewey, J. Logic, the theory of inquiry. New York: H. Holt, 1938.
- Ehrlich, D., Guttman, I., Schonbach, P., and Mills, J. Post-decision exposure to relevant information. Journal of Abnormal and Social Psychology, 1957, 54, 98-102.
- Ehrlich, H. J. and Lee, D. Dogmatism, learning, and resistance to change: A review and a new paradigm. Psychological Bulletin, 1969, 71, 249-260.
- Eisenman, R. Pleasing and interesting visual complexity: Support for Berlyne. Perception and Motor Skills, 1966, 23, 1167-1170.
- Feather, N. T. Cigarette smoking and lung cancer: A study of cognitive dissonance. Australian Journal of Psychology, 1962, 14, 55-64.
- Feather, N. T. Acceptance and rejection of arguments in relation to attitude strength, critical ability, and intolerance of inconsistency. Journal of Abnormal and Social Psychology, 1964, 69, 127-136.
- Feather, N. T. Attitude and selective recall. Journal of Personality and Social Psychology, 1969, 12, 310-319.
- Festinger, L. A theory of cognitive dissonance. Stanford: Stanford University Press, 1957.
- Festinger, L. Cognitive dissonance. Scientific American, 1962, 207, 94-102.
- Festinger, L. Conflict, decision, and dissonance. London: Tavistock, 1964.
- Festinger, L. and Carlsmith, J. M. Cognitive consequences of forced compliance. Journal of Abnormal and Social Psychology, 1959, 58, 203-210.

- Flanders, N. A. Teacher influence, pupil attitudes, and achievement. In J. Raths, J. E. Fancella, and J. S. Van Ness (Eds.), Studying teaching. Englewood Cliffs, N. J.: Prentice-Hall, 1967.
- Foulkes, D., and Foulkes, S. H. Self-concept, dogmatism, and tolerance of trait inconsistency. Journal of Personality and Social Psychology, 1965, 2, 104-111.
- Freedman, J. L. Confidence, utility, and selective exposure: A partial replication. Journal of Personality and Social Psychology, 1965, 2, 778-780. (a)
- Freedman, J. L. Preference for dissimilar information. Journal of Personality and Social Psychology, 1965, 2, 287-289. (b)
- Freedman, J. L. and Sears, D. O. Voters' preferences among types of information. American Psychologist, 1963, 18, 375.
- Freedman, J. L. and Sears, D. O. Selective exposure. In L. Berkowitz (Ed.), Advances in experimental psychology. Vol. 2. New York: Academic Press, 1965.
- Gage, N. L. Theories of teaching. In E. R. Hilgard (Ed.), Theories of learning and instruction: The sixty-third yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press, 1964.
- Gagne, R. M. Instruction and the conditions of learning. In L. Siegel (Ed.), Instruction--Some contemporary viewpoints. San Francisco: Chandler, 1967.
- Glass, D. E. Individual differences and the resolution of cognitive inconsistencies. In R. P. Abelson, E. Aronson, W. J. McGuire, T. H. Newcomb, M. J. Rosenberg, and P. H. Tannenbaum (Eds.), Theories of cognitive consistency: A sourcebook. Chicago: Rand McNally, 1968.
- Hamilton, D. L. Responses to cognitive inconsistencies: Personality, discrepancy level, and response stability. Journal of Personality and Social Psychology, 1969, 11, 351-362.
- Hays, W. L. Statistics for psychologists. New York: Holt, Rinehart, and Winston, 1963.
- Hunt, M. F. and Miller, G. R. Open and closed-mindedness, belief-discrepant communication behavior, and tolerance for cognitive inconsistency. Journal of Personality and Social Psychology, 1968, 8, 35-37.

- Hunt, M. P. and Metcalf, L. E. Teaching high school social studies. New York: Harper and Row, 1968.
- Jahnke, J. C. A behavioristic analysis of instruction. In L. Siegel (Ed.), Instruction--Some contemporary viewpoints. San Francisco: Chandler, 1967.
- Jones, A. Information deprivation in humans. In B. A. Maher (Ed.), Progress in experimental personality research. Vol. 3. New York: Academic Press, 1966.
- Kirk, R. E. Experimental design: Procedures for the behavioral sciences. Belmont, California: Wadsworth, 1968.
- Kleck, R. E. and Wheaton, J. Dogmatism and exposure to opinion-consistent and opinion-inconsistent information. Journal of Personality and Social Psychology, 1967, 5, 249-252.
- Leckart, B. T. Looking time: The effects of stimulus complexity and familiarity. Perception and Psychophysics, 1966, 1, 142-144.
- McGuire, W. J. Selective exposure: A summing up. In R. P. Abelson, E. Aronson, W. J. McGuire, T. H. Newcomb, M. J. Rosenberg, and P. H. Tannenbaum (Eds.), Theories of cognitive dissonance: A sourcebook. Chicago: Rand McNally, 1968.
- Medley, D. M. and Mitzel, H. E. A technique for measuring classroom behavior. Journal of Educational Psychology, 1958, 49, 86-92.
- Miller, G. R. and Rokeach, M. Individual differences and the resolution of cognitive inconsistencies. In R. P. Abelson, E. Aronson, W. J. McGuire, T. H. Newcomb, M. J. Rosenberg, and P. H. Tannenbaum (Eds.), Theories of cognitive consistency: A sourcebook. Chicago: Rand McNally, 1968.
- Mills, J. Effect of certainty about a decision upon post-decision exposure to consonant and dissonant information. Journal of Personality and Social Psychology, 1965, 2, 749-752.
- Mills, J. Interest in supporting and discrepant information. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, and P. H. Tannenbaum (Eds.), Theories of cognitive consistency: A sourcebook. Chicago: Rand McNally, 1968.
- Mills, J., Aronson, E., and Robinson, J. Selectivity in exposure to information. Journal of Abnormal and Social Psychology, 1959, 59, 250-253.
- Mills, J. and Ross, A. Effects of commitment and certainty upon interest in supporting information. Journal of Abnormal and Social Psychology, 1964, 59, 250-253.

- Mittman, L. R. and Terrell, G. An experimental study of curiosity in children. Child Development, 1964, 35, 851-855.
- Moffatt, M. P. Social studies instruction. Englewood Cliffs, New Jersey: Prentice-Hall, 1963.
- Pettigrew, T. F. The measurement and correlates of category width as a cognitive variable. Journal of Personality, 1958, 26, 532-544.
- Pyron, B. A factor-analytic study of simplicity-complexity of social ordering. Perceptual and Motor Skills, 1965, 22, 259-272.
- Rhine, R. J. Some problems in dissonance theory research on information selectivity. Psychological Bulletin, 1967, 69, 21-28.
- Rokeach, M. The open and closed mind. New York: Basic Books, 1960.
- Rosen, S. Post-decision affinity for incompatible information. Journal of Abnormal and Social Psychology, 1961, 63, 188-190.
- Rosenman, M. F. Dogmatism and the movie "Dr. Strangelove." Psychological Reports, 1967, 20, 942.
- Rothkopf, E. Z. Some theoretical and experimental approaches to problems in written instruction. In J. D. Krumboltz (Ed.), Learning and the educational process. Chicago: Rand McNally, 1965.
- Rothkopf, E. Z. Two scientific approaches to the management of instruction. In R. M. Gagne and W. J. Gephart (Eds.), Learning research and school subjects. Itasca, Illinois: F. E. Peacock, 1966, 107-149.
- Salomon, G. and Sieber, J. E. Relevant subjective response uncertainty as a function of stimulus-task interaction. American Educational Research Journal, 1970, 7, 337-349.
- Schultz, C. B. and Di Vesta, F. J. The effects of dogmatism in relation to expert endorsement of beliefs on problem-solving. In F. J. Di Vesta, D. R. Peters, N. M. Sanders, C. B. Schultz, and P. D. Weener, Instructional strategies: Multivariable studies of psychological processes related to instruction. A semiannual report to Advanced Research Projects Agency, Order Number 1269. January, 1970.
- Scott, W. A. Attitude change through reward of verbal behavior. Journal of Abnormal and Social Psychology, 1957, 55, 72-75.
- Sears, D. O. Biased indoctrination and selectivity of exposure to new information. Sociometry, 1965, 28, 363-376.

- Sears, D. O. Opinion formation and information preferences in an adversary situation. Journal of Experimental Social Psychology, 1966, 2, 130-142.
- Sears, D. O. The paradox of de facto selective exposure without preferences for supportive information. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, and P. H. Tannenbaum (Eds.), Theories of cognitive consistency: A sourcebook. Chicago: Rand McNally, 1968.
- Sears, D. O. and Freedman, J. L. The effects of expected familiarity with arguments upon opinion change and selective exposure. Journal of Personality and Social Psychology, 1965, 2, 420-426.
- Sieber, J. E. Lessons in uncertainty. The Elementary School Journal, 1969, 69, 304-312.
- Smith, B. O. A concept of teaching. In B. O. Smith and R. H. Ennis (Eds.), Language and concepts in education. Chicago: Rand McNally, 1961.
- Smith, R. O. and Meux, M. O. A study of the logic of teaching. Urbana: Bureau of Educational Research, College of Education, University of Illinois, 1962.
- Smith, B. O., Stanley, W. O., and Shores, J. H. Fundamentals of curriculum development. New York: Harcourt, Brace, and World, 1957.
- Smith, D. D. Dogmatism, cognitive consistency, and knowledge of conflicting facts. Sociometry, 1968, 31, 259-277.
- Smock, E. D. and Holt, B. G. Children's reactions to novelty: An experimental study of "curiosity motivation." Child Development, 1962, 33, 631-642.
- Steiner, I. D. Receptivity to supportive and nonsupportive communications. Journal of Abnormal and Social Psychology, 1962, 65, 266-277.
- Suchman, J. R. The child and the inquiry process. In J. R.aths, R. Panchella, and J. S. Van Ness (Eds.), Studying teaching. Englewood Cliffs, New Jersey: Prentice-Hall, 1967.
- Taba, H. Curriculum development: Theory and practice. New York: Harcourt, Brace, and World, 1962.
- Vacchiano, R. B., Strauss, P. S., and Hochman, L. The open and closed mind: A review of dogmatism. Psychological Bulletin, 1969, 71, 261-273.
- Wesley, E. B. and Wronski, S. P. Teaching social studies in high schools. Boston: D. C. Heath, 1964.

- White, B. J. and Alter, R. D. Dogmatism, authoritarianism, and contrast effects in judgment. Perceptual and Motor Skills, 1965, 20, 99-101.
- Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill, 1962.
- Withall, J. Development of a technique for the measurement of socio-emotional climate in classrooms. Journal of Experimental Education, 1949, 17, 347-361.
- Woodruff, A. D. Cognitive models of learning and instruction. In L. Siegel (Ed.), Instruction--Some contemporary viewpoints. San Francisco: Chandler, 1967.
- Zajonc, R. B. Cognitive theories in social psychology. In G. Lindzey and E. Aronson (Eds.), The handbook of social psychology, Vol. 1. Historical introduction--Systematic positions (2nd ed.). Reading, Massachusetts: Addison-Wesley, 1968.
- Zajonc, R. B. and Morrisette, R. The role of uncertainty in cognitive change. Journal of Abnormal and Social Psychology, 1960, 61, 168-175.

APPENDIX A

THE UNCERTAINTY SCALE

### Description of the Uncertainty Scale

The Uncertainty Scale was designed to measure individual pre-dispositions to generate response competition in problematic situations. It was developed and tested on 100 students drawn from several education courses at The Pennsylvania State University in March, 1969. A factor analysis of the responses of these Ss yielded three factors which comprise the sub-scales of this test. Items which did not load on these three factors were dropped and additional items inserted which were similar to those included in the three factors.

In its present form, the scale consists of 42 items and three filler questions (numbers 3, 5, and 21). This version was administered to 284 students of an introductory course in educational psychology also at The Pennsylvania State University during the spring term of 1969 and to 596 students in the fall term of that year.

These administrations yielded the following descriptive information. The internal consistency estimate of reliability (Alpha Coefficient) of the first administration was .77; the reliability of the second administration was .80. An item analysis provided t test comparisons of the means of a high total score group (highest 27%) and a low total score group (lowest 27%) on each item. According to this analysis, the obtained t ratios for items 19 and 34 for the spring, 1969 administration and items 1, 2, 19, 27, and 34 for the fall, 1969 administration were less than  $t = 3.00$ , suggesting that these items, relative to other items in the scale, failed to

adequately discriminate among the subjects. Correlations of data obtained from the fall, 1969 administration yielded a negative relationship ( $r = -.34$ ,  $p < .005$ ) between uncertainty and Form E of the Dogmatism Scale (Rokeach, 1960) and a negative relationship ( $r = -.32$ ,  $p < .005$ ) between uncertainty and the Scale of Intolerance of Ambiguity (Budner, 1962).

#### Sub-Scales

Secondary ignorance. The S makes a choice between two stimuli, and then indicates on a five point scale how certain he is that he is correct. Both stimuli in the pair are equidistant from the correct answer, and therefore, "equally wrong." Numbers: 7, 11, 13, 14, 17, 18, 23, 26, 29, 33, 38, and 41.

Subjective probability. The S is presented with an ambiguous situation and he rates how certain he is that the one interpretation given is correct. Numbers: 2, 4, 9, 15, 16, 19, 22, 24, 25, 28, 30, 32, 35, 37, 39, 43, and 45.

Novelty. The S rates his interest in unusual or novel experiences or situations. Numbers: 1, 6, 8, 10, 12, 20, 27, 31, 34, 36, 40, 42, and 44.

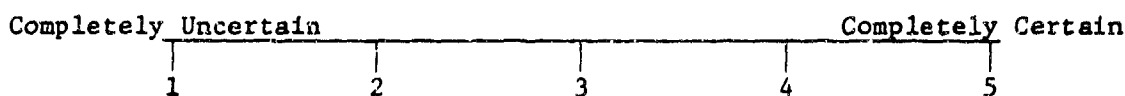
### Instructions to the Uncertainty Scale

Each of the items in this survey will be followed by the question "To what extent do you agree?" or "How certain are you?" Use one of the scales below to describe either your agreement or your certainty.

#### Scale of Agreement - Disagreement



#### Scale of Certainty - Uncertainty



Number 1 indicates strong disagreement or complete uncertainty; number 5 indicates strong agreement or complete certainty. Consider the other numbers as equal intervals along the scale with 3 the mid-point.

Notice that for some of the items that require you to indicate your degree of certainty you must, in addition, record your answer to the question itself. On these double response items you will record your answer in columns 8 or 9 and record your certainty, as usual, in columns 1 through 5 using the same line of the answer sheet.

#### Sample Item

12. Would you estimate that the correct time is now closer to 8:00 p.m. or to 11:30 p.m.?

(Col. 8) 8:00 p.m. (Col. 9) 11:30 p.m.  
How certain are you? (Use Col. 1-5 on answer sheet.)

#### Sample Answer Sheet

12.	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
						■				■

This indicates that the answer, 11:30 p.m. (Col. 9), has been made with complete certainty (Col. 5).

Strongly Disagree				Strongly Agree
Completely Uncertain				Completely Certain
1	2	3	4	5


1. I look forward to situations in which I'm really not sure what will happen next. To what extent do you agree? (Use Col. 1-5 on answer sheet.)
2. You can tell what a person is like by the clothes he wears. To what extent do you agree?
3. Was John F. Kennedy the 27th or 35th president?

(Col. 8) 27th (Col. 9) 35th  
How certain are you? (Use Col. 1-5 on answer sheet.)

4. If the first stop in a trip from New York is Chicago, the next one would be further west. How certain are you?
5. The speed of sound is closest to 600 mph or 300 mph.

(Col. 8) 600 mph (Col. 9) 300 mph  
How certain are you? (Use Col. 1-5 on answer sheet.)

6. I do not enjoy tasting food that is entirely different from the food I usually eat. To what extent do you agree?

7.  Does this outline most closely resemble Wyoming or Colorado?

(Col. 8) Wyoming      (Col. 9) Colorado  
How certain are you?      (Use Col. 1-5 on answer sheet.)

8. I'm happiest doing a job that I've worked at often enough to be familiar with it. To what extent do you agree?
9. If you heard thunder, how sure would you be that it would rain?
10. Given a choice between two answers to a problem, I'd want to learn more about the one that makes the most common sense rather than the one that seems to contradict the facts. To what extent do you agree?









APPENDIX B

MATERIALS USED TO MANIPULATE CONFIDENCE

### Test of Intrinsic Understanding of Attitude Change

Here's the first situation. Suppose a child wanted to play with a toy. But, he was told that he was not allowed to play with it. In one case, he was given a threat of mild punishment if he played with it; in the other case he was given a threat of severe punishment. Which do you think would be most effective in getting the child to not be interested in the toy or to want it--the threat of mild punishment or the threat of severe punishment?

For the second situation, suppose groups of teenage girls were given their choice of two popular records as a reward for a task they had performed. They were told that they would be given only one to keep. After making a selection, one group was actually given only one record. However, the other group was given both records. All girls then rated how much they liked the record that was originally their first choice. Which girls would rate that record higher--the girls given both records or the girls given only one?

Imagine this final situation. Housewives were asked to rank twenty household appliances for their attractiveness. Some housewives were rewarded by being given their choice of keeping their second or nineteenth ranked appliance. Others were rewarded by being given their choice of keeping their second or their third ranked appliance. After making this choice, which group do you think would value their second ranked appliance most--those who chose between their nineteenth or those who chose between their second and third ranked appliances?

## Matrix Used to Compute High or Low Percentile Ranks

## Matrix for Computing Intuitive Test Scores\*

PERCENTILE RANK FOR: ABILITY TO UNDERSTAND ATTITUDE CHANGE

Percentage of Students Right on Specific Item

Number of Items Correct

	1	2	3
0	-	-	-
1	23	11	19
2	27	21	32
3	31	26	36

\*Based on Helmstadter Percentile Conversion Procedure

$$[Y_x = \frac{(X_x - X_w)}{S_x} \sqrt{Piq1}]$$

APPENDIX C

EXPERIMENTAL MATERIALS

List of Slides Describing Modified Version of the  
Festinger-Carlsmith (1959) Experiment

Slide Set 1

Description of Experiment

This experiment had four main stages:

- a) The subject performed a boring, uninteresting task.
- b) he was promised payment for misrepresenting the experimental task to someone else.
- c) he actually did misrepresent it to another person.
- d) the subject's attitude toward the task was measured.

Slide Set 2

Description of Experiment

The boring task consisted of counting out twelve spools from a large container, placing them on a tray, emptying the tray into a different container, and then refilling it with twelve more spools. This was done for one hour.

Slide Set 3

Description of Experiment

In order to get the subjects to publicly misrepresent their private attitudes, they were asked to replace the regular experimental assistant who was ill. His job was to prepare waiting subjects from a different treatment group by convincing them that the boring task was really exciting and enjoyable.

Slide Set 4

Description of Experiment

The subject misrepresented the task to a "waiting subject" who was actually a confederate of the experimenter. She was a student who had been hired and trained for this role.

Slide Set 5

Description of Experiment

After the experimenter left, the confederate mentioned that she had heard that this was a boring experiment. The subject's typical response was something like, "Oh no, it's really very interesting." After that, the girl confederate listened quietly, agreeing with what the subject said. This conversation was tape-recorded without the subject's knowledge.

## Slide Set 6

Description of Experiment

A general test was then presented in another room. It was introduced as an evaluation of all the experiments conducted by the department of psychology at the university where the experiment took place. Embedded in this test were questions to measure the subject's attitude toward the boring task.

## Slide Set 7

Description of Experiment

After this test, subjects were told the reason for the experimental procedures including the use of the tape recorder. (By the way, they were asked to return the payment. All agreed to do this.)

## Slide Set 8 (left)

Conflict - Definition

A conflict is created by a situation in which an individual acts inconsistently with his beliefs or attitudes. A person will usually try to reduce conflict.

## Slide Set 8 (right)

Reward - Definition

A reward is an event or object that strengthens some behavior that it follows, such as an attitude. A person will usually try to strive to get the reward.

## Slide Set 9 (right)

Conflict - Proponents

Dr. Charles R. Dobbs of Stanford University emphasized the conflict aspect of the experiment to explain changes in attitudes. He is an expert in the field of cognitive psychology.

## Slide Set 9 (left)

Reward - Proponents

Dr. Ralph C. Beck of Harvard University emphasized the reward aspect of this experiment to explain change in attitudes. He is an expert in the field of operant conditioning.

## Slide Set 10 (right)

Conflict - Proponents

Dobbs studied under the direction of Michael Kalbach. The recipient of many awards for his experimental research, he is presently the director of the "Institute for the Study of Cognitive Processes."

## Slide Set 10 (left)

Reward - Proponents

Beck was a student of Ernest Halsey. A past president of the Eastern Psychological Association, he is the author of several well-accepted books on psychology including "The handbook of behavioral research."

## Slide Set 11 (left)

Conflict - Assumptions

Man's behavior, as pictured by the theory of conflict, is jointly determined by the interaction of his will and the environment in which he finds himself.

## Slide Set 11 (right)

Conflict - Assumptions

Man's behavior, according to the Law of Reward, is completely determined by the environment in which he finds himself irrespective of notions such as will.

## Slide Set 12 (right)

Conflict - Assumptions

The theory of conflict assumes that formation of attitudes is a dynamic process in which man is an active participant.

## Slide Set 12 (left)

Reward - Assumptions

The law of reward assumes that attitudes are formed by a mechanistic process in which man is a passive factor.

## Slide Set 13 (left)

Conflict - Example

A lifelong opponent of the welfare program became a protagonist after he publicly supported the general democratic platform.

## Slide Set 13 (right)

Reward - Example

A lifelong opponent of the welfare program changed his views after he received a large medicare payment to cover his hospitalization.

## Slide Set 14 (left)

Conflict - Example

The announcer switched his brand to "Blitz" cigarettes after he began to advertise them on national television as part of his regular duties.

## Slide Set 14 (right)

Reward - Example

The announcer changed his brand to "Blitz" cigarettes after the network awarded him a large bonus for the "Blitz" commercials he had made.

## Slide Set 15 (right)

Conflict - Example

He couldn't decide which of two identical twins to marry. However, after he proposed to Agatha she seemed much more attractive than Martha.

## Slide Set 15 (left)

Reward - Example

He couldn't decide which of two identical twins to marry. However, after he learned of her larger dowry, Agatha seemed much more attractive than Martha.

Slide Set 16 (right)

Conflict - Example

The boy liked both the toy train and the bike, but was told he could only have one. After he picked the bike, he liked it much better than the train set.

Slide Set 16 (left)

Reward - Example

The boy liked both the toy train and the bike. After he was told he could earn money on a paper route with the bike, he preferred it to the train set.

Slide Set 17 (left)

Conflict - Rationale

Whether a conflict exists depends considerably upon the individual's particular set of values, attitudes, and expectations.

Slide Set 17 (right)

Reward - Rationale

Whether an event will serve as a reward depends in part upon each person's past experience with it.

Slide Set 18 (right)

Conflict - Rationale

Under certain conditions, conflict will fail to produce a change of attitude:

- a) when an individual is unaware of the conflict.
- b) when the conflicting elements are of unequal importance.

Slide Set 18 (left)

Reward - Rationale

There are times when reward will fail to bring about a change of attitude:

- a) when an individual is satiated.
- b) when he is unable to utilize the reward for physical or cultural reasons.

## Slide Set 19 (left)

Conflict - Rationale

When a person acts inconsistently with his beliefs or attitudes, he can justify his action by bringing his belief in line with it.

## Slide Set 19 (right)

Reward - Rationale

When a person is rewarded for acting inconsistently with his beliefs or attitudes, a new belief that is consistent with his rewarded action is established.

## Slide Set 20 (left)

Conflict - Rationale

A change of attitude depends on the amount of justification a person must make. The closer the conflicting elements are to being equally attractive, the more justification a person must make for being inconsistent.

## Slide Set 20 (right)

Reward - Rationale

A change of attitude requires an association between the reward and the new belief that has been established. The new attitude gains its strength from the strength of this association.

## Slide Set 21 (right)

Conflict - Rationale

The more a person is rewarded for an act inconsistent with his attitude, the less equally attractive the conflicting elements are and the less he needs to justify that action. Therefore with the larger reward, less attitude change is required.

## Slide Set 21 (left)

Reward - Rationale

The more a person is rewarded for an act that is inconsistent with his original belief the more the association between the reward and the new belief is strengthened. Therefore, with a larger reward, there will be a greater change in attitude.

Slide Set 22 (right)

Conflict - Predictions

The theory of conflict would predict that the modest, one dollar payment for telling the waiting subject that the task was enjoyable would produce the greater attitude change. . . the small payment is insufficient to justify the misrepresentation, so the individual must make his own justification.

Slide Set 22 (left)

Reward - Predictions

The law of reward predicts that the meager one dollar payment for convincing the waiting subject that the task was enjoyable would result in little, if any, attitude change . . . the strength of the association between the reward and new belief or attitude would be barely changed.

Slide Set 23 (left)

Conflict - Predictions

Dobbs' theory of conflict predicts that the generous payment of twenty dollars for saying, "I enjoyed the task," would produce the least attitude change . . . . The twenty dollars justifies making the statement . . . so, the individual doesn't have to make other justifications by rationalizing his act.

Slide Set 23 (right)

Reward - Predictions

Beck's law of reward predicts that the large, twenty dollar payment for saying, "I enjoyed the task," would result in greater attitude change . . . the reward would become more strongly associated with the new attitude . . . so, the association would be strong enough to produce a change.

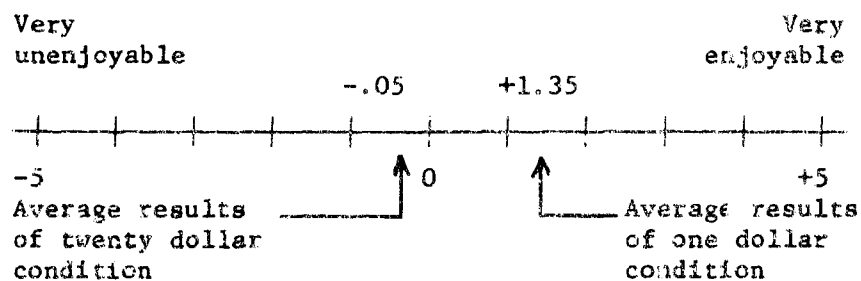
Slide Set 24

Compare the following  
results with the predictions  
you have just seen

## Slide Set 25

Results

Subjects were asked how enjoyable the task was. They judged it on a ten point scale.

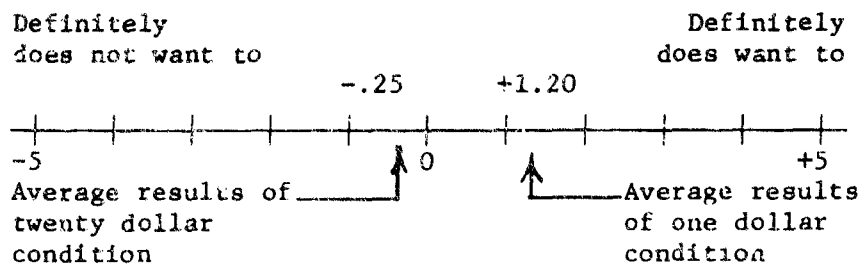


The difference between the two conditions is statistically significant.

## Slide Set 26

Results

Subjects rated their desire to participate in a similar experiment on a ten point scale.

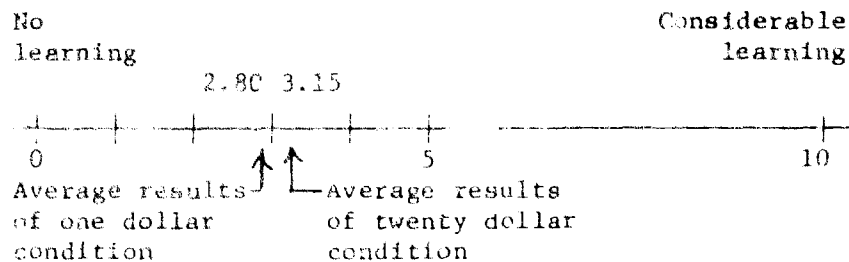


The differences were statistically significant.

## Slide Set 27

Results

Subjects rated how much they learned by performing the experimental task.





APPENDIX D

DEPENDENT MEASURES

## Multiple Choice Test of Experimental Topic

Instructions

Answer the following questions by printing the CAPITAL letter of your choice in the space before each item.

- \_\_\_\_\_ 1. As they understood it, subjects were paid either one or twenty dollars for:
- (A) Telling someone about the experimental task.
  - B Doing the experimental task.
  - C Changing their attitude toward the experimental task.
  - D Everything they did in the experiment.
- \_\_\_\_\_ 2. The boring task:
- A Consisted of continuously replacing spools on a tray.
  - B Lasted an hour.
  - (C) Both 'A' and 'B'.
  - D Neither 'A' nor 'B'.
- \_\_\_\_\_ 3. Which of the following was not a major stage in the experiment?
- A Misrepresenting the task to another person.
  - B Measuring the subject's attitude toward the task.
  - C Performing a boring, uninteresting task.
  - (D) Persuading the subject to misrepresent the task.
- \_\_\_\_\_ 4. The experimenter's confederate:
- A Argued strongly with the subject about the boring task.
  - B Remained silent
  - (C) Made brief opening comments about the boring task, but usually listened.
  - D Raised counter-arguments during the first half of the conversation only.
- \_\_\_\_\_ 5. Age is a factor that was presented in the rationale of which of these theories:
- \*\*\*
- A Law of Reward.
  - B Theory of Conflict.
  - C Both of these.
  - (D) Age was not discussed.
- \_\_\_\_\_ 6. Self-justification is important to which theory?
- \*\*
- A Law of Reward.
  - (B) Theory of Conflict.
  - C Both of these.
  - D Self-justification was not discussed.

- \_\_\_\_ 7. The spokesman for the Law of Reward is:  
\*  
A Ernest N. Halsey.  
B William Blakely.  
(C) Ralph C. Beck.  
D Charles R. Dobbs.
- \_\_\_\_ 8. The assumption that attitudes control behavior was associated with which theory:  
\*\*\*  
A Theory of Conflict.  
B Law of Reward.  
C Both 'A' and 'B'.  
(D) This assumption was not presented.
- \_\_\_\_ 9. After the youngster selected the bike, he liked it better than the train set that he had earlier considered just as attractive.  
\*\*  
(A) This is a restatement of the conflict example.  
B This is a restatement of the reward example.  
C This is not a correct restatement of any example that was presented.  
D As presented above, this could be considered a restatement of both the conflict and reward examples.
- \_\_\_\_ 10. The amount of reward is a result of the amount of conflict. This idea is included in the rationale of which theory?  
\*\*\*  
A Law of Reward.  
B Theory of Conflict.  
C Both theories include this rationale.  
(D) This rationale was not presented.
- \_\_\_\_ 11. Reward will not produce a change of attitude when:  
\*  
A A new belief has not been established.  
(B) An individual is unable to use it.  
C Both 'A' and 'B'.  
D Neither 'A' nor 'B'.
- \_\_\_\_ 12. According to the theory of conflict, conflict is best described as:  
\*\*  
A Struggle.  
B Argument.  
(C) Inconsistency.  
D Controversy.

- \_\_\_\_ 13. Simplicity of task is a notion associated with which theory?  
\*\*\*  
A Law of Reward.  
B Theory of Conflict.  
C Both theories.  
(D) Neither theory.
- \_\_\_\_ 14. The assumption that man's behavior is the result of external forces is held by which theory?  
\*  
(A) Law of Reward.  
B Theory of Conflict.  
C Both 'A' and 'B'.  
D Neither 'A' nor 'B'.
- \_\_\_\_ 15. Some psychologists predict twenty dollars will produce the greatest attitude change because twenty dollars would:  
\*  
(A) Strengthen the association.  
B Reduce inconsistency.  
C Both 'A' and 'B'.  
D Neither 'A' nor 'B'.
- \_\_\_\_ 16. The larger the reward, the smaller the attitude change is part of the rationale for which of these theories?  
\*\*  
A Law of Reward.  
(B) Theory of Conflict.  
C Both of these.  
D This rationale was not presented.
- \_\_\_\_ 17. According to the Law of Reward, reward is best described as an:  
\*  
A Increase in benefits, such as more money.  
B Event that helps or assists in meeting an objective.  
C Event that compensates for an effort.  
(D) Event that strengthens some behavior.
- \_\_\_\_ 18. According to the Law of Reward, the attitude change process involves:  
\*  
A Self-justification.  
B Dissatisfaction with present conditions.  
(C) The establishment of a new belief.  
D None of these.
- \_\_\_\_ 19. Attitudes were equated to concepts in the rationale of which of these theories?  
\*\*\*  
A Law of Reward.  
B Theory of Conflict.  
C Both of these.  
(D) This was not presented.

- \_\_\_\_ 20. Some psychologists predict one dollar will produce the greatest attitude change because one dollar would:  
\*\*  
A Reduce inconsistency.  
(B) Require justification.  
C Both 'A' and 'B'.  
D Neither 'A' nor 'B'.
- \_\_\_\_ 21. The assumption that man's behavior is determined by the interaction of his will and the environment is held by which theory:  
\*\*  
(A) Theory of Conflict.  
B Law of Reward.  
C Both 'A' and 'B'.  
D Neither 'A' nor 'B'.
- \_\_\_\_ 22. Instinct is an important notion in which theory?  
\*\*\*  
A Law of Reward.  
B Theory of Conflict.  
C Both theories.  
(D) Neither theory.
- \_\_\_\_ 23. After he learned of Agatha's dowry, he thought she was more attractive than her twin sister.  
\*  
A This is a restatement of the conflict example.  
(B) This is a restatement of the reward example.  
C This is not a correct restatement of any example that was presented.  
D As presented above, this could be considered a restatement of both the conflict and reward examples.
- \_\_\_\_ 24. The spokesman for the Theory of Conflict is:  
\*\*  
A Ralph C. Beck.  
(B) Charles R. Dobbs.  
C Neal B. Lippitt.  
D Michael Kalbach.
- \_\_\_\_ 25. Strength of association is a notion drawn from which theory?  
\*  
(A) Law of Reward.  
B Theory of Conflict.  
C Both theories.  
D Neither theory as presented.
- \_\_\_\_ 26. Smaller reward means less attitude change. This is part of the rationale for which of these theories?  
\*  
(A) Law of Reward.  
B Theory of Conflict.  
C Both 'A' and 'B'.  
D This was not presented.

- \_\_\_ 27. Attitudes are highly unstable and susceptible to frequent modification and change. This characterization of attitudes is represented by:  
\*\*\*  
A Law of Reward.  
B Theory of Conflict.  
C Both of these.  
(D) This characterization of attitudes was not presented.
- \_\_\_ 28. Which conclusion seems most justified on the basis of the results?  
  
A The Law of Reward was upheld.  
(B) The Theory of Conflict was upheld.  
C Neither was confirmed.  
D Both received substantial support.
- \_\_\_ 29. For which of the following questions were the results non-significant?  
  
A Would you want to participate in a similar experiment?  
B How enjoyable was the experiment?  
C Both 'A' and 'B'.  
(D) Neither 'A' nor 'B'.
- \_\_\_ 30. For which of the following questions did the results favor the twenty-dollar condition?  
  
A How enjoyable was the experiment?  
B How important was the experiment scientifically?  
C Both 'A' and 'B'.  
(D) Neither 'A' nor 'B'.
- \_\_\_ 31. The tape-recorded conversation between the experimental confederate and the subject was analyzed to:  
  
A Make sure that the experimental confederate did what she was supposed to do.  
(B) Examine the subject's efforts to convince the confederate.  
C Maintain a controlled experimental condition.  
D Measure the time the experimental confederate spent talking to the subject.
- \_\_\_ 32. The analysis of the tape-recorded discussion indicated that:  
  
(A) Subjects in the twenty-dollar condition were more persuasive.  
B The confederate talked to the one-dollar subjects more than she did to the twenty-dollar subjects.  
C Subjects in the one-dollar condition spent more time on the topic.  
D The one-dollar subject was more persuasive but spent less time on the topic.

\_\_\_ 33. According to the results of this experiment, if you wanted to help someone break a bad habit you should:

- A Pay them well for publicly announcing that they are going to break their habit.
- B Use common sense; the results are too inconclusive.
- (C) Have them announce publicly that they are going to break their habit.
- D Pay them for breaking the habit.

Key:    \* represents items requiring congruent information.  
         \*\* represents items requiring discrepant information.  
         \*\*\* represents items requiring both congruent and discrepant information.

Rating Sheet for Measure of Interest in  
Congruent, Neutral, and Discrepant Articles.

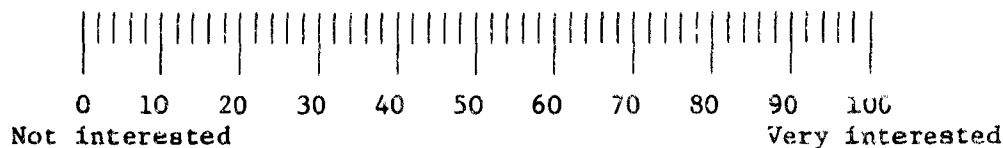
SELECTION LIST OF READINGS

Later in the term we will pass out Evaluation Forms to all the subjects in this experiment. We will ask you to make a general evaluation of the material presented on slides. Before making this evaluation, it would be helpful if you read one of the following articles. The articles are all very brief reprints selected from psychological journals and are all more recent than the experiment just presented. The reprints will be distributed to you in about a week.

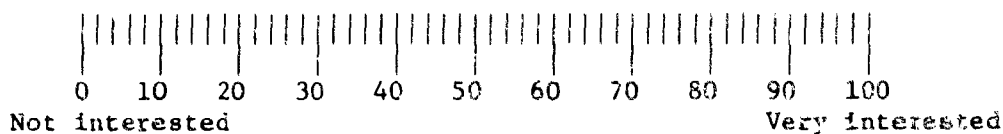
Since we may not have enough copies for everyone to get their first, or even their second choice, rate these articles carefully. The articles in which you are most interested should be rated highest and the lower ratings should represent those in which you are least interested.

In order to make your choice as accurate as possible, we have provided an Interest Scale for each article. Place an "X" directly below the line on the scale that best describes your interest in each article. Do not use the same point on the scale for more than one article.

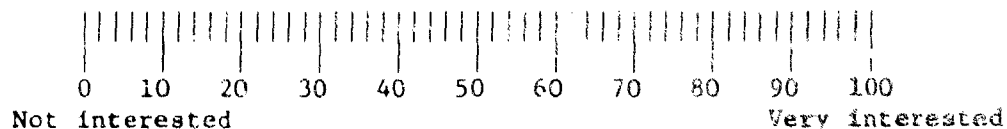
Beck, Ralph C. "Reward and Reinforcement Produce a Change of Beliefs."



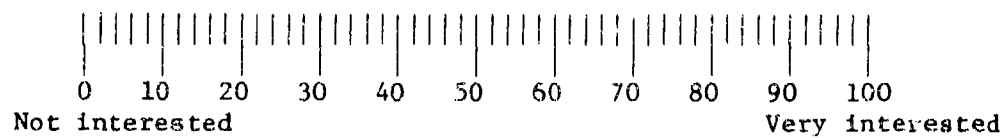
Blakely, William R. "The Relationship of Attitude Strength to Age."



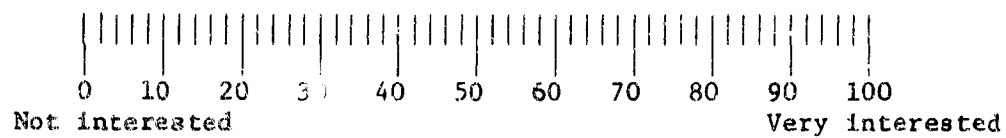
Dobbs, Charles R. "Conflict and Dissonance as a Cause of Attitude Change."



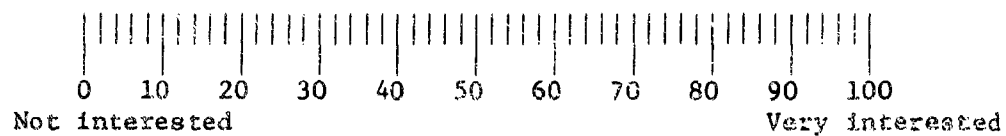
Halsey, Ernest N. "Reward Plays a Part in Determining Behavior."



Kalbach, Michael "Conflict as a Fundamental Human Motive."



Lippitt, Neal B. "Attitude Formation Processes."



## VITA

Charles B. Schultz was born in Pittsburgh, Pennsylvania, in 1929. He graduated from nearby Dormont High School and subsequently earned a B.A. degree in American Civilization from the University of Pennsylvania in 1951. In 1961, he graduated from Temple University with an M.Ed. degree in education.

Mr. Schultz taught English and social studies at Morrisville High School, Morrisville, Pennsylvania from 1958 to 1963. He was then engaged for three years as a social studies curriculum specialist for the Pennsylvania Department of Education. In 1966, he was appointed an Instructor in the Department of Secondary Education at The Pennsylvania State University. Since January 1969, he served as a research assistant in the Department of Educational Psychology. Mr. Schultz is a member of the National Council for the Social Studies, the Phi Delta Kappa professional education fraternity, and the American Educational Research Association. His publications include the following:

- Schultz, C. B. A filmed introduction to the concept of culture. Audio-visual Instructor, 1964, 9, 680-681.
- Schultz, C. B. Focus on World Cultures. Harrisburg, Pennsylvania: Pennsylvania Department of Public Instruction, 1966.
- Schultz, C. B. Social studies--A case of deprivation. The Social Studies, 1970, 61, 58-68.
- Schultz, C. B. and Aurbach, H. A. The usefulness of cumulative deprivation as an explanation of educational deficiencies. Merrill-Palmer Quarterly. 1970, in press.
- Ribble, R. B. and Schultz, C. B. The social-substantive schedule: A language for the assessment of congruence between operationally stated objectives and instructional implementation. In A. Simon and E. Bayer (Eds.), Mirrors for Behavior: An Anthology of Observational Instruments. Vol. 12. Philadelphia: Research for Better Schools, Inc., 1970.

The Effect of Uncertainty, Confidence, and  
Individual Differences on the Initiation and  
Direction of Information-seeking Behaviors

by

Charles B. Schultz

An Abstract of a Thesis

in

Secondary Education

Submitted in Partial Fulfillment  
of the Requirements  
for the Degree of

Doctor of Philosophy

September 1970

The Pennsylvania State University  
The Graduate School

## ABSTRACT

The purpose of this experiment was to examine three questions related to learning and instruction: 1) Do competing responses associated with the arousal of epistemic curiosity (i.e., subjective uncertainty) activate a search for information with the consequent acquisition of knowledge? 2) Is belief-discrepant information sought when it has the potential for reducing subjective uncertainty (i.e., when it has intrinsic utility) and when the individual is confident he can refute the discrepant position? 3) Do differences in dogmatism, intolerance of ambiguity, and subjective uncertainty predispose individuals to seek or avoid discrepant information?

Hypotheses related to these questions were tested by two experiments. The experimental materials for both studies were comprised of 30 pairs of slides. In the critical slide-pairs, one member containing belief-congruent information was projected simultaneously with another containing belief-discrepant information. The Ss were instructed to select and examine the "more interesting" slide in the pair. In Experiment I, levels of uncertainty were induced by presenting evidence which contradicted Ss' beliefs (Incongruity), evidence which supported their beliefs (Certainty), and some evidence which supported and some which contradicted their beliefs (Doubt). An absolute Control group was given no evidence regarding the belief-commitment they had made. The Ss in Experiment II were administered a "test" on the experimental topic. Feedback was provided which alleged that S demonstrated an unusual grasp of the experimental topic (High Confidence) or

that his understanding was considerably below normal (Low Confidence).

According to the measure of time spent examining slides and to test results on the experimental topic, Incongruity and Doubt scores were higher than Control scores while Certainty scores were lower than those of the Control. These findings can be explained by a drive reduction model of curiosity. Thus, when Ss experienced uncertainty due to the presentation of contradictory evidence, a motivational state of curiosity resulted which activated epistemic behaviors (e.g., examination of slides). The consequent acquisition of new knowledge was associated with the reduction of curiosity and was thereby reinforced.

When stimulus conditions were certain, Ss sought and acquired congruent information; a finding which is in accord with notions about cognitive dissonance. However, when Ss faced an incongruous stimulus situation, their ratings of interest, selection of slides, and acquisition of knowledge were directed toward discrepant information; a finding which is difficult to explain in terms of dissonance theory. The intrinsic utility hypothesis, derived from the drive reduction model of epistemic curiosity, provides a potential explanation. It would suggest that discrepant information was sought by Ss in the Incongruity Condition to reduce curiosity resulting from the presentation of contradictory evidence.

The manipulation of confidence had no effect on selection, examination, and acquisition of discrepant information. Confidence manipulations typically are induced by presenting authority beliefs

which either confirm (High Confidence) or reject (Low Confidence) Ss' responses to a "test." Accordingly, it was reasoned that persons who are influenced by authority beliefs (i.e., dogmatic persons) avoid discrepant information in the High Confidence condition and seek discrepant information in the Low Confidence condition. On the other hand, selectivity of open-minded persons was presumed to be unaffected by confidence manipulations. The findings were in the expected direction, however they were not reliable.

Finally, the effects of personality traits on selectivity were examined under conditions of experimentally induced uncertainty. Although dogmatism was unrelated to selectivity, a reliable, negative relationship was obtained between intolerance of ambiguity and acquisition of discrepant information while a positive relationship was obtained between subjective uncertainty (based on a test constructed for this experiment) and acquisition of discrepant information. The latter finding, in particular, suggests that the effects of curiosity on selectivity can be modified by predispositions to be uncertain.